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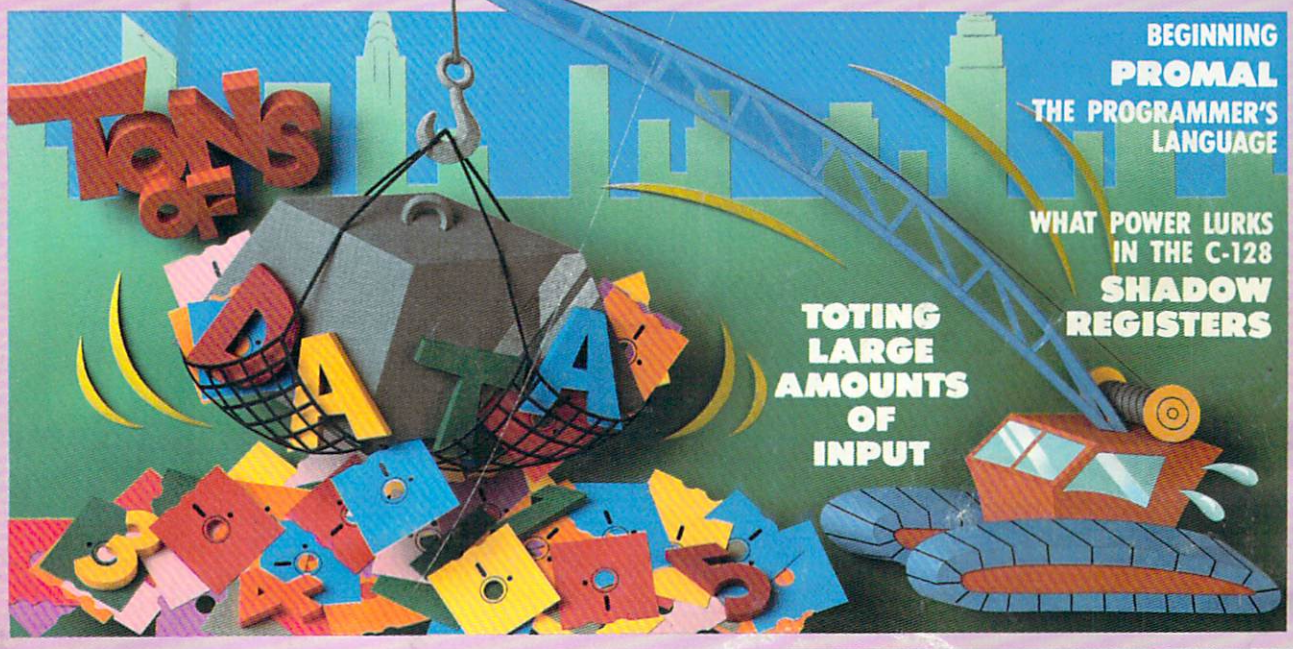

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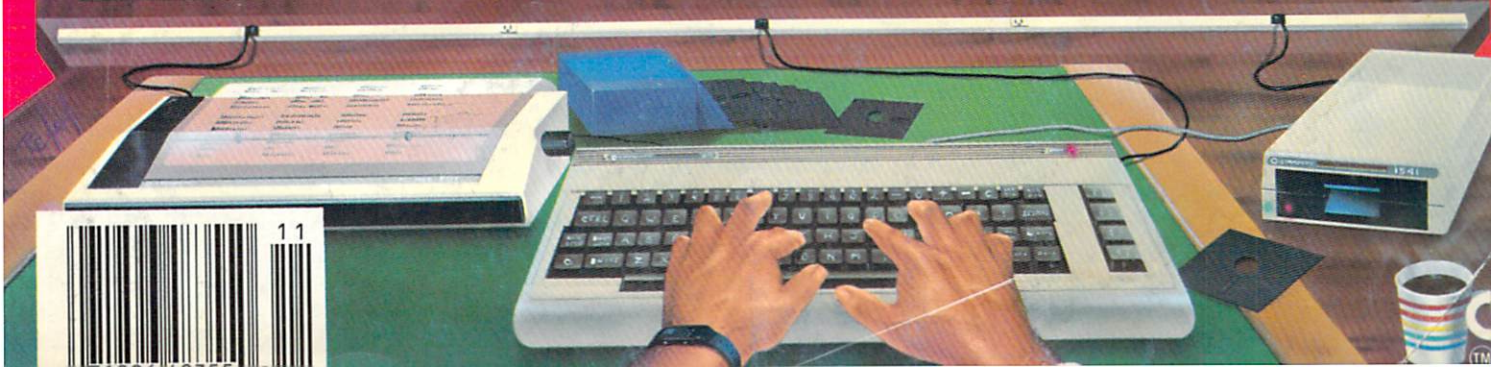

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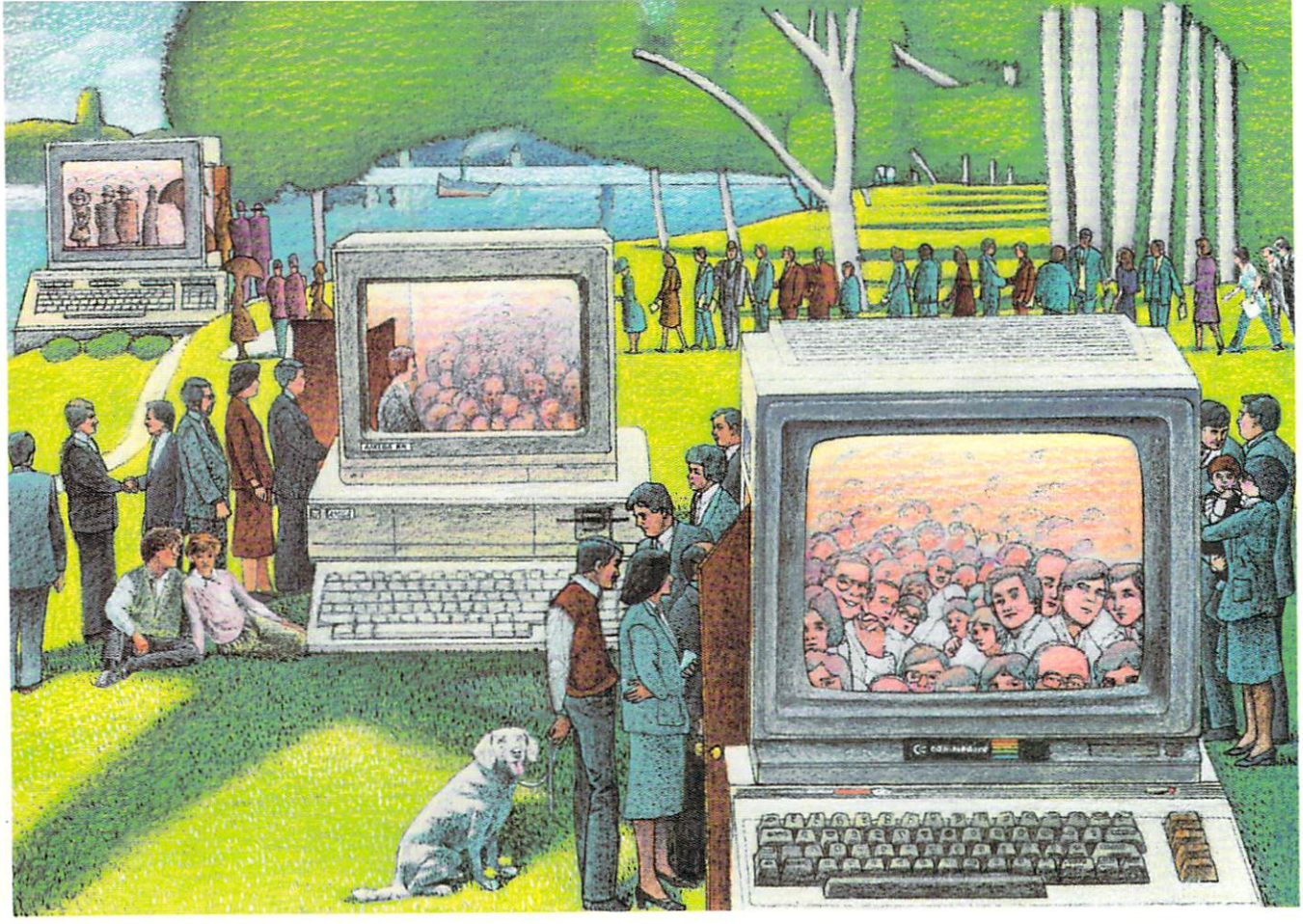

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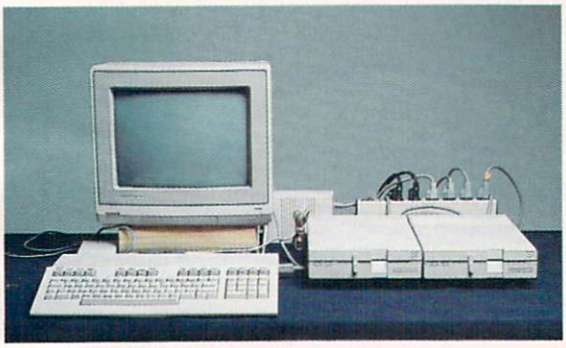

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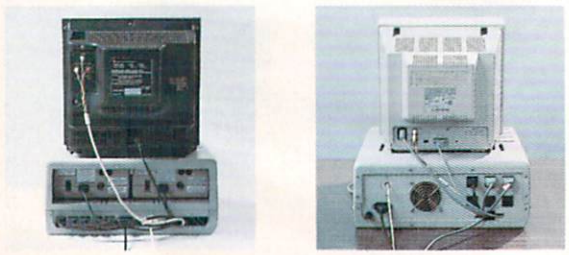

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VIEW FROM THE BRIDGE

At no time of the year do we relish writing this column—our description of the contents of the current issue of *Ahoy!*—as much as in the fall, when our page count swells to its largest total. We can't wait to tell you about the special features in this 140-plus page issue—and, come to think of it: why *should* we?

- If you've ever felt buried under *Tons of Data,* Dale Rupert will lighten your load with his *Rupert Report* on sequential file storage. Included are *Datawriter* and *Datareader* routines for the C-64 and C-128 that can serve as models for your own file access programs. (Turn to page 20.)
- For the second month running, Cleveland M. Blakemore has dominated our games lineup with two high-quality contributions. *Guardian* recalls arcade classics like *Buck Rogers* and *Star Wars* as you race a shuttlecraft down a scrolling 3-D trench, blasting at an assortment of adversaries. (Turn to page 74.) Certain to win acclaim as our most offbeat program ever, *Teleporter* requires a keen eye and a steady disintegrator finger to survive in the employ of Captain Finch "Hardnose" Legree. (Turn to page 35.)
- Tony Brantner's tight graphics have elicited their share of oohs and ahs in the past *(Swoop, Meteor Run, Knockout)*—but he'll really bowl you over with this month's *Tenpins!*
- Comprised of five different scenarios that can cycle through to over fifty screens of nonstop action, *Discs of Daedalus* will throw even the most experienced space adventurer. (Turn to page 55.)
- Proving that we needn't leave earth to find suitable computer game villains, *Detonation* requires you, an explosives expert, to defuse the bombs Koloccan terrorists have placed throughout the sacred temple of Remkcalb. (Spell that backwards and you'll have the name of the programmer—or else, turn to page 56.)
- Of course, placing two programs in a single *Ahoy!* is commonplace for Buck Childress. This month's *Syntax Patrol* finds errors in your program lines immediately upon entry. (Turn to page 52.) And *128 RAM Check,* an adaptation of Buck's *Free RAM Check* for the 64 (May '86 *Ahoy!*), promotes error-free operation by testing the BASIC RAM in banks 0 and 1. (Turn to page 39.)
- Depending on where your programming priorities lie, one of two programs in this issue may meet your needs. *Long Lines* doubles the C-64 line editor's capacity to 160 characters, making it possible to write faster-running programs with less memory overhead. (Turn to page 73.) *Deluxe List* follows behind space-stingy programmers and reroutes their work into an easily readable format. (Turn to page 36.)
- Mark Andrews breaks new ground in this month's *Commodore Roots* column on the C-128's "shadow registers"—undocumented areas of memory useful in sprite programming. You'll be a better machine language programmer when you know what *The Shadow Knows!* (Turn to page 27.)
- In the last of three *Cadet's Columns* devoted to alternative programming languages, Cheryl Peterson introduces beginners and experts alike to PROMAL. (Turn to page 95.)
- Seldom is a single game accorded feature coverage in our *Entertainment Software Section,* but we deemed QuantumLink's *Habitat* unusual enough to merit such treatment. Arnie Katz and his gang of game experts also provide reviews of *Frankie Goes to Hollywood, Super Cycle, Mind Mirror, Spitfire 40, Psi 5 Trading Co.,* and the entire Hi Tech Expressions line of creative software. (Turn to page 41.)
- In our *Reviews* section, Morton Kevelson goes to his usual elaborate lengths in profiling two products useful in accelerating computer-to-printer communications: R.J. Brachman's *Serial Box* and Xetec's *Printer Enhancer.* Additionally, Ted Salamone presents the results of his thorough testing of Timeworks' *Partner 128* cartridge. (Turn to page 58.)
- We hate to imagine the outcry that would result if this issue didn't also include *Commodares,* where intermediate and advanced programmers either meet the challenge—or their match; an extra-long installment of *Tips Ahoy!,* the best programming and hardware hints we can cull from our readership; *Scuttlebutt,* detailing upcoming releases for your holiday shopping convenience; and *S.O.S.,* where we provide answers to even the most unanswerable questions—even if we have to make them up.

This month's *Ahoy! Disk* features another of the bonuses it's becoming famous for—a demo of Firebird's *The Pawn* graphic adventure. For ordering information, see page 93; or try page 68 for an even better deal—the *Ahoy! Disk Magazine.*

And speaking of deals—if you procrastinated too long the last time we offered you a free modem (May), turn to page 88 before we pull the rug out again!

—David Allikas

Ahoy! Port of Call on PlayNET

Hosted every week by *Ahoy!* SYSOP B.W. "Captain B" Behling, the *Ahoy! Port of Call* offers PlayNET subscribers an opportunity to teleconfer with *Ahoy!'s* writers and editors and other special guests. The show begins every Saturday at 11:00 p.m.

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SCUTTLEBUTT

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BLACK IS BLACK

As you know by now if you check the financial pages daily to see if your 64, 128, or Amiga is an orphan, Commodore International reported a $1.2 million profit for the quarter ended June 30, 1986. That may not sound like much for a company Commodore's size, but it's reason for popping corks in West Chester, PA when compared to the $124 million loss for the same period in 1985. Commodore, in fact, was so excited about completing their first profitable quarter in over 18 months that they sent us a press release the very same day—despite the fact that they were thus obliged to publicize their $128 million loss for the fiscal *year* ended June 30, compared to a $114 million loss for the prior fiscal year.

But let's be as positive as Commodore. As life-threatening as their recent financial woes were, and despite the fact that its bank debt of over $138 million remains unresolved, the company managed to return to profitability despite overwhelming odds, partially due to such bold measures as laying off one third of its employees and closing down a number of its non-computer manufacturing operations. Commodore computer owners hoping for many more years of strong software and hardware support can take heart from the fact that the company has survived the darkest chapter in its history, and that more substantial gains are likely to be reported for the third and fourth (Christmas) quarters of 1986.

Commodore International, 215-431-9100 (see address list, page 14).

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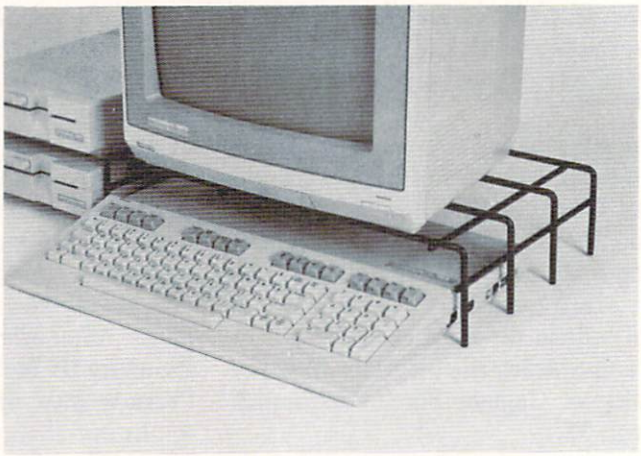

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Cheatsheet Products Inc., 412-781-1551 (see address list, page 14).

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Free Spirit Software, Inc., 312-352-7323 (see address list, page 14).

IS OUR INTERFACE RED

In our mention of the *PPD* printer driver program in August's *Scuttlebutt* (page 12), we quoted a price of $10 for an unassembled cable kit. The correct price is $20. Drude Micro Services also informs us that the C-128 version is ready for shipping, and will be included on the same disk as the C-64 version.

Drude Micro Services, 319-277-5106 (see address list, page 14).

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Epyx, Inc., 408-745-0700 (see address list, page 14).

GRAPHICS INTERFACE

The Device One parallel printer interface for the C-64 ($119.95) includes among its many features the ability to download fonts, pictures, and disk directories directly from disk, print hi-res pictures and text together in two sizes and half-tone mode, and combine up to four different font sizes and thirteen different font styles (four of which are in ROM) in a single sentence. A banner mode provides for letters up to 8" high, and a letterhead mode allows a message or picture to be printed in the same spot on every page. Near letter quality characters can be integrated with text, pictures, fonts, and banners.

(Deep breath.) Screen dump mode for lo- and hi-res screens; hex and decimal dump modes; Pet ASCII conversion mode; device number selection; built-in 16K buffer; definition of all four margins; transparent and semi-transparent modes. The included utility disk can be used for creating fonts, drawing pictures, and converting pictures from most graphic packages to work with built-in picture dump.

Progressive Peripherals & Software, 303-825-4144 (see address list, page 14).

GAME RELEASES

Tass Times in Tonetown requires players to find Gramps, missing in a village in another dimension where "all rules change." The player must also become "tass" to avoid being marked as a tourist and booted out of Tonetown. Onscreen icons allow the game to be played with a minimum of typing. $34.95 for the 64; $39.95 for the Amiga.

Activision has also released the first two in a series of Designer's Libraries for use with *Garry Kitchen's GameMaker: The Computer Game Design Kit,* each providing predesigned game elements to facilitate game creation. The *Sports* library includes a race track, football field, skier, and hockey player, and such sound effects as crowd noises, buzzers, a referee's whistle, and the crack of a bat. The *Science Fiction* disk provides space ships, energy fields, planet surfaces, and monsters. Selections can be used as they are or customized using *GameMaker.* Each C-64 disk is $19.95.

And finally, Activision has formed another new division: Electric Dreams, which will distribute foreign entertainment software in America. Three initial releases have been announced, all for the C-64, each $29.95:

The Rocky Horror Show incorporates the main elements and characters from the movie, requiring you as Brad to find the abducted Janet and assemble the De-Medusa machine.

Spindizzy compels you to guide a gyroscopic device across 386 multilevel screens that must be assembled into a single world.

Based on the Tomy toys, *Zoids* requires you, an earthling, to intervene in the war between the Red and Blue Zoids by building a robot to defeat the Red Zoid Imperial Leader.

Activision, 415-960-0410 (see address list, page 14).

In order to foil the intergalactic smuggling ring called the *Breakers* ($39.95) and free the enslaved Lau people, text adventurers must outwit the criminals and dodge mutant space cops while combining the sacred elements that can restore order to the planet. The game's parser understands 1500 words, making dialogue puzzles with several characters possible. A reference card and book are included.

Broderbund Software, 415-479-1700 (see address list, page 14).

Software Toolworks' *Chessmaster 2000* offers 20 levels of play from Newcomer to Grandmaster, an open-

Mean 18's ***course architect makes it possible to design or modify an entire course, including trees, bushes, skyline, background, terrain, course name, and any or all of the 18 holes and par values.***
READER SERVICE NO. 195

ing library of 71,000 moves, and a "teach" mode allowing the program to demonstrate all possible moves. Also featured are onscreen clocks, "coffeehouse" mode (in which the computer plays a slightly addled game to encourage the beginner), and analysis of games in progress or games already played. $39.95 for the 64; $44.95 for the Amiga.

Planned releases from Software Toolworks include *The New Technology Coloring Book,* utilizing the Amiga's graphics capabilities to take the user on a "journey through the mysteries of science and the universe;" and *Life and Death,* simulating the experience of practicing medicine in the emergency room of a big city hospital.

The Software Toolworks, 213-278-8450 (see address list, page 14).

Effective immediately, Datasoft games will be packaged with Frequent Buyer Coupons that can be collected and cashed in for free gifts. Seven coupons will entitle the customer to choose a gift worth up to $20 from a 100-item catalog; ten coupons, a gift worth up to $25; fourteen coupons, up to $50.

Datasoft, IntelliCreations, Inc., 818-886-5922 (see address list, page 14).

Space, the Ultimate Frontier ($8.99) places the user on the bridge of a starship with the task of defending the sector against the invading Klyron Empire.

Ufland Software, Inc., 519-538-1758 (see address list, page 14).

The Amiga version of Accolade's *Mean 18* golf simulation ($44.95) features enhanced graphics, resolution, color, and sound, four courses including St. Andrews, Augusta National, and Pebble Beach, a golf course architect, and numerous strategy and play options. Also included are a driving range and putting green, plus such landscape features as sand traps, bunkers, water, and roughs.

Accolade, 408-446-5757 (see address list, page 14).

A Christmas Adventure has been available for the 64 for the past three holiday seasons, but this year BitCards will send a free sampler/demo disk containing over half of the actual program to anyone who sends $1 in cash or stamps to cover shipping costs. Price of the full program, to which it is possible to add personalized holiday greetings, is $24.95 plus $3 shipping.

BitCards Inc., 800-821-5226/ext. 432 or 514-274-1103 (see address list, page 14).

Newly adapted for the Amiga from Electronic Arts:

EA's first adaptation of an arcade game, *Marble Madness* ($49.95) duplicates the phenomenal arcade original faithfully in terms of 3-D graphics, sound, and gameplay. The goal of one or two players is to race a marble down treacherous paths in an attempt to beat the clock to the goal line. Adversaries along the way include the Hoovers, who seek to inhale you, Marble Munchers, and the Steelie, who attempts to knock you marble into a fatal tumble. Each of the six different raceways has its own stereo soundtrack.

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Featuring enhanced graphics and sound, the *Skyfox* combat flight simulation, *Adventure Construction Set*, and the action-magic adventure *Archon II: ADEPT* will retail for $39.95 each.

Electronic Arts, 415-571-7171 (see address list, page 14).

Casino Blackjack ($19.95) provides full player and dealer statistics and a wide range of casino options including split pair, insurance, and double down.

Dragon Magic Software (see address list, page 14).

Polarware/Penguin Software's illustrated adventures, *Transylvania* and its sequel *Crimson Crown*, have been enhanced for the Amiga. The games, each $29.95, chronicle the struggle between the royal family of Wallachia and the evil Vampyr.

Polarware/Penguin Software, 312-232-1984 (see address list, page 14).

Six releases for the C-64 and/or Amiga from Artworx:

Beach Blanket Volleyball ($14.95), playable against another human or against the C-64 on nine levels, provides the usual opportunities to return impossible shots, spike the ball close to the net, etc. All that's missing is the sand in your hot dog.

Police Cadet for the C-64 ($14.95) requires the recruit to keep the peace on a beat, a stakeout, in a deserted park, and in a supermarket, capturing armed suspects or shooting them when necessary. But don't shoot an innocent bystander, or your career will be over.

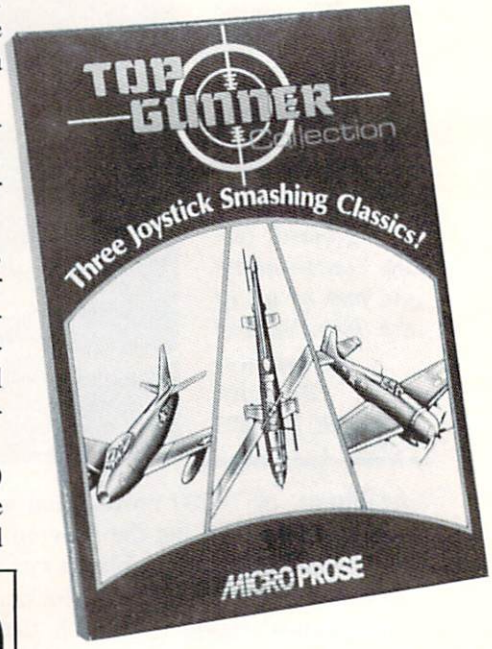
Hole In One Golf, which includes club and swing selection and a course design option, has been adapted for the Amiga ($29.95), while *Hole In One Golf +6* ($19.95) for the 64 adds a sextet of courses to Artworx's original program.

Equestrian Showjumper for the 64 ($14.95) lets one to six players compete with horses from nations around the world, jumping fences of varying height and difficulty on twelve provided courses.

Strip Poker, adapted for the Amiga ($39.95) after release in several other formats, makes use of a variety of computer opponents, each with his or her own style of play, personality, and comments—and, of course, detailed graphics. Two female opponents are included; data disks containing additional opponents of both sexes will be made available.

Bridge 4.0, also adapted for the Amiga ($29.95), utilizes speech synthesis and lets the player make all bird and card selections via the mouse.

Artworx Software, 716-425-2833



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(see address list, page 14).

MicroProse's *Top Gunner Collection* ($24.95) combines three previous releases on one double-sided disk for the C-64: *HellCat Ace* (re-creation of 14 significant US-Japan battles), *MiG Alley Ace* (dogfighting between the F-86 Sabre Jet and the Red Chinese MiG 15), and *Air Rescue* (piloting a copter through an underground labyrinth).

MicroProse won't reveal the name or any other details about the flight simulator they plan to release in the first quarter of '87, except that it will have "the best of everything all the other simulators have."

MicroProse, 301-667-1151 (see address list, page 14).

BOOKS

A revised and expanded edition of Jim Butterfield's previous volume covering only the 64, *Machine Language for the Commodore 64, 128 and Other Commodore Computers* ($14.95) offers step by step instructions, examples, and exercises for programmers at all levels, including beginners with knowledge of fundamentals. The book covers machine architecture (where a program can be placed in memory, how to print to the screen, how to input from keyboard), tools (using a monitor to read and change memory, using a simple assembler, and debugging), and machine language itself.

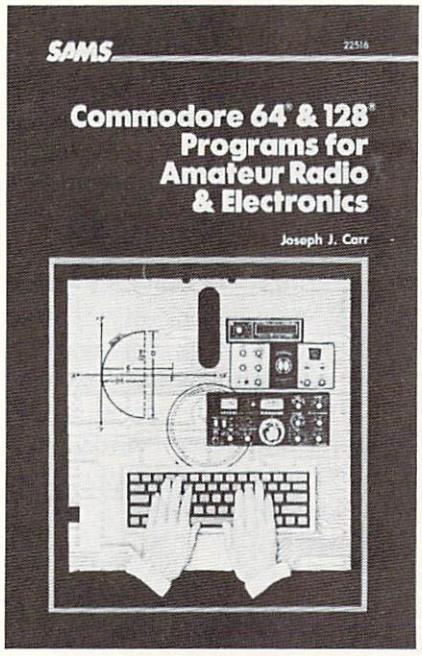
Prentice Hall Press, 212-333-2916 (see address list, page 14).

A booklength tutorial devoted to SubLOGIC's *Flight Simulator II, The Flight Simulator Book* ($19.95) uses dozens of actual government aviation charts to teach the student to do everything an airline captain does, from aviation basics through maneuvers, flight planning, cross-country procedures, radio navigation, instrument landings, and more.

En Route Books, 602-846-6737 (see address list, page 14).

These from Howard W. Sams:

Commodore 64 & 128 Programs for Amateur Radio & Electronics ($14.95), a task-oriented guide for the electronics hobbyist, programmer, engineer, and technician, includes 42 programs (available on disk) to save time and simplify tasks.



Task-oriented guide for the hobbyist.
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John D. Lenk's Troubleshooting & Repair of Microprocessor-Based Equipment ($21.95) details numerous procedures and tricks for diagnosing, isolating, and locating faults in microprocessor circuits.

Howard W. Sams & Co., 1-800-428-SAMS (see address list, page 14).

EDUCATIONAL RELEASES

Gessler has released Spanish and French Hangman games for the 64: *La Corrida de Toros,* set in a bull ring, and *La Guilotine,* depicting events at the Bastille. Each $29.95 program includes hundreds of words in numerous categories, a vocabulary review, and a matching exercise.

Also from Gessler comes CLEF, a 30-disk series of Computer-assisted Learning Exercises for French for use in beginning and intermediate French classes. Each C-64 disk focuses on a particular point of grammar or group of vocabulary words, including a series of individually graded exercises and analysis of errors. Price is $19.95 for one disk, $85 for five, or $499 for all thirty.

Gessler Educational Software, 212-673-3113 (see address list, page 14).

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Educational Activities will send its catalog of over 100 programs (not all of them available for Commodore) free to educators who request it.

Educational Activities, 516-223-4666 (see address list below).

BASIC EXTENSION

The Boss ($35) provides C-64 users with over 40 new BASIC commands and functions, mostly useful for writing data communications-type programs. Included are commands for performing I/O operations with the modem, turning the modem on and off, getting user inputs of specified lengths from the other end, checking for carrier, and more. The program handles all ASCII translation and utilizes system timers.

SoftTools, 514-739-3046 (see address list below).

For more information on products accompanied by a Reader Service Number, fill out and return the card bound between pages 66 and 67.

MIDI SOUNDS

MIDImouse has added Volumes 3 and 4 to its CZ Sound Collection series of acoustic and electronic sounds for the MIDI-equipped C-64. Each disk-based volume is $14.95, or $21.95 for two, $28.95 for three, or $35.95 for four. The collection is also available on two 64-voice RAM cartridges priced at $69.95 each, or both for $124.95. Demo cassette is $4.

Also new is a Digital Sound Cassette of 125 sounds for $17.95. (A disk

Continued on page 146

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20833 Stevens Creek Blvd.
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Phone: 412-781-1551

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1200 Wilson Drive
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IntelliCreations Inc.
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Dragon Magic Software
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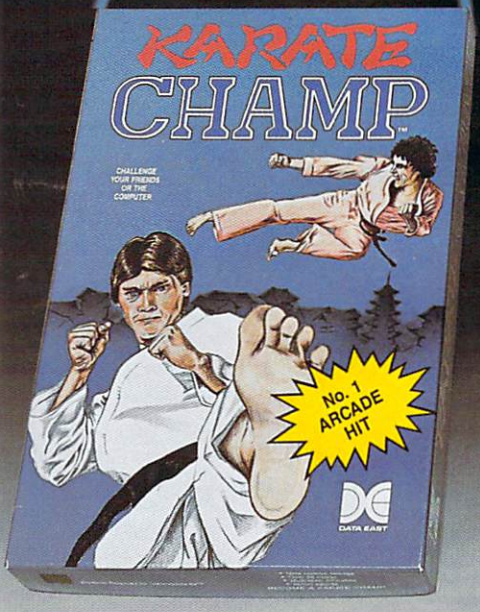

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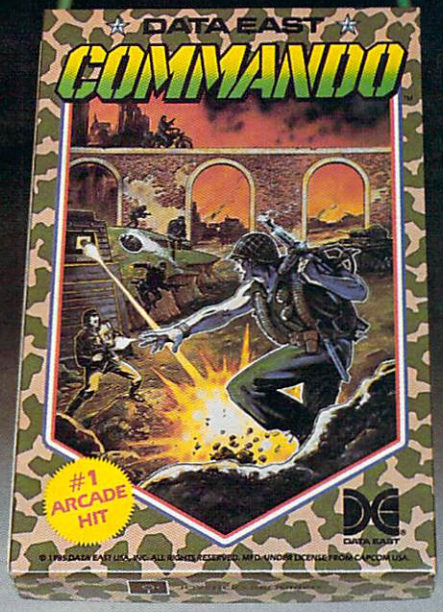

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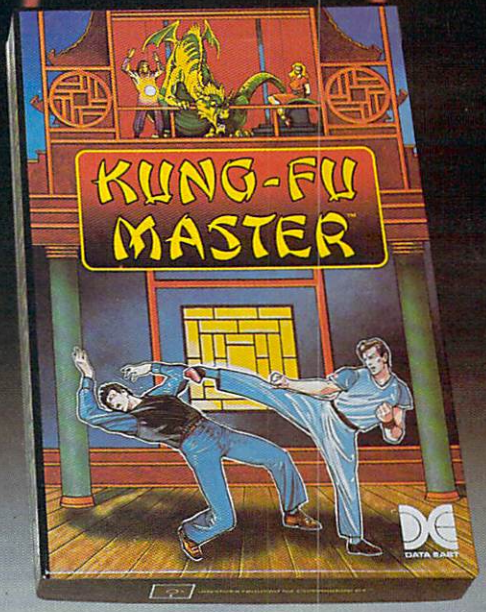

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DATA EAST

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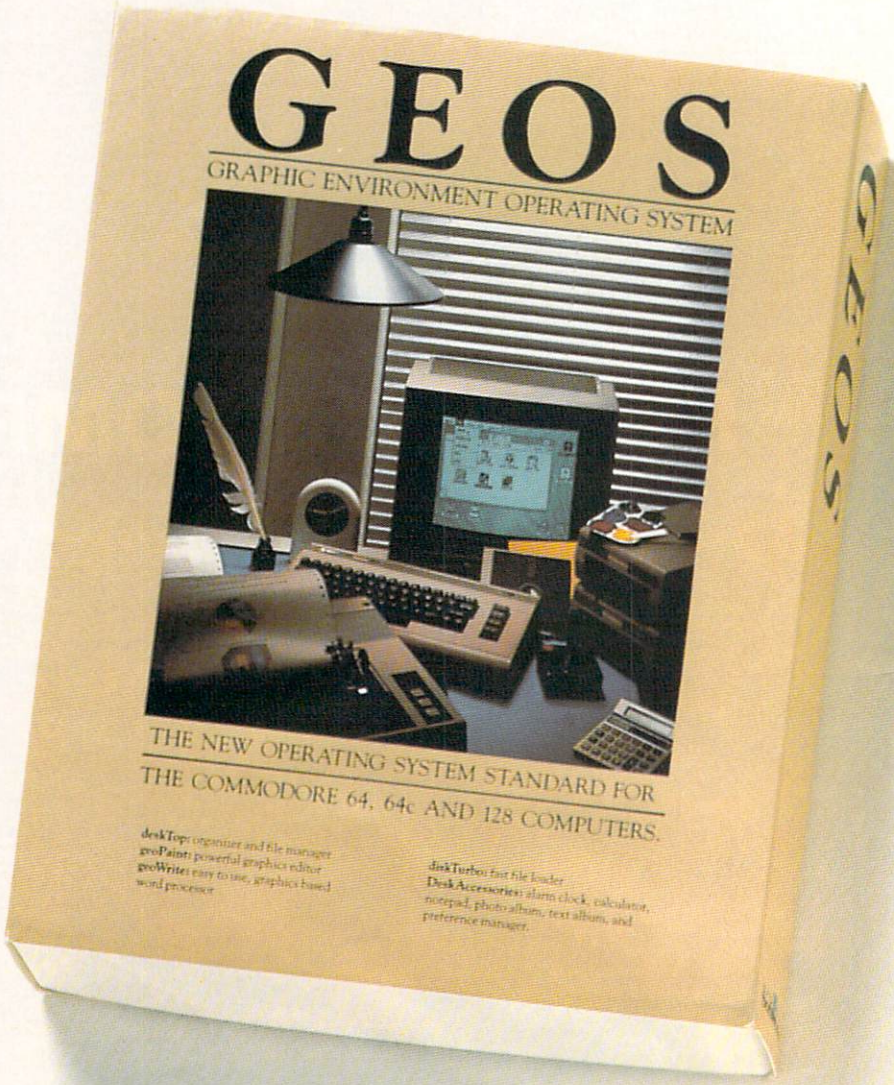
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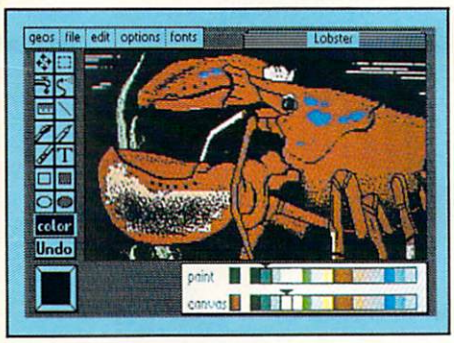

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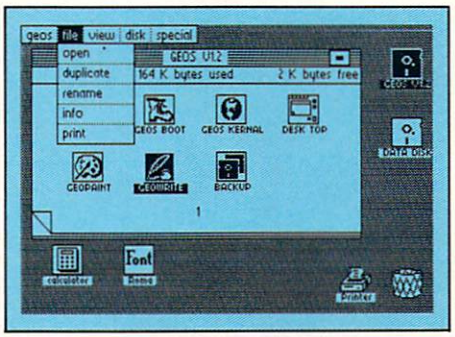

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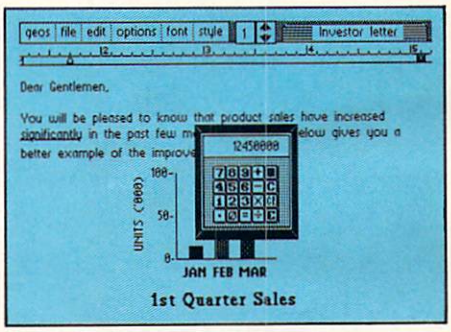

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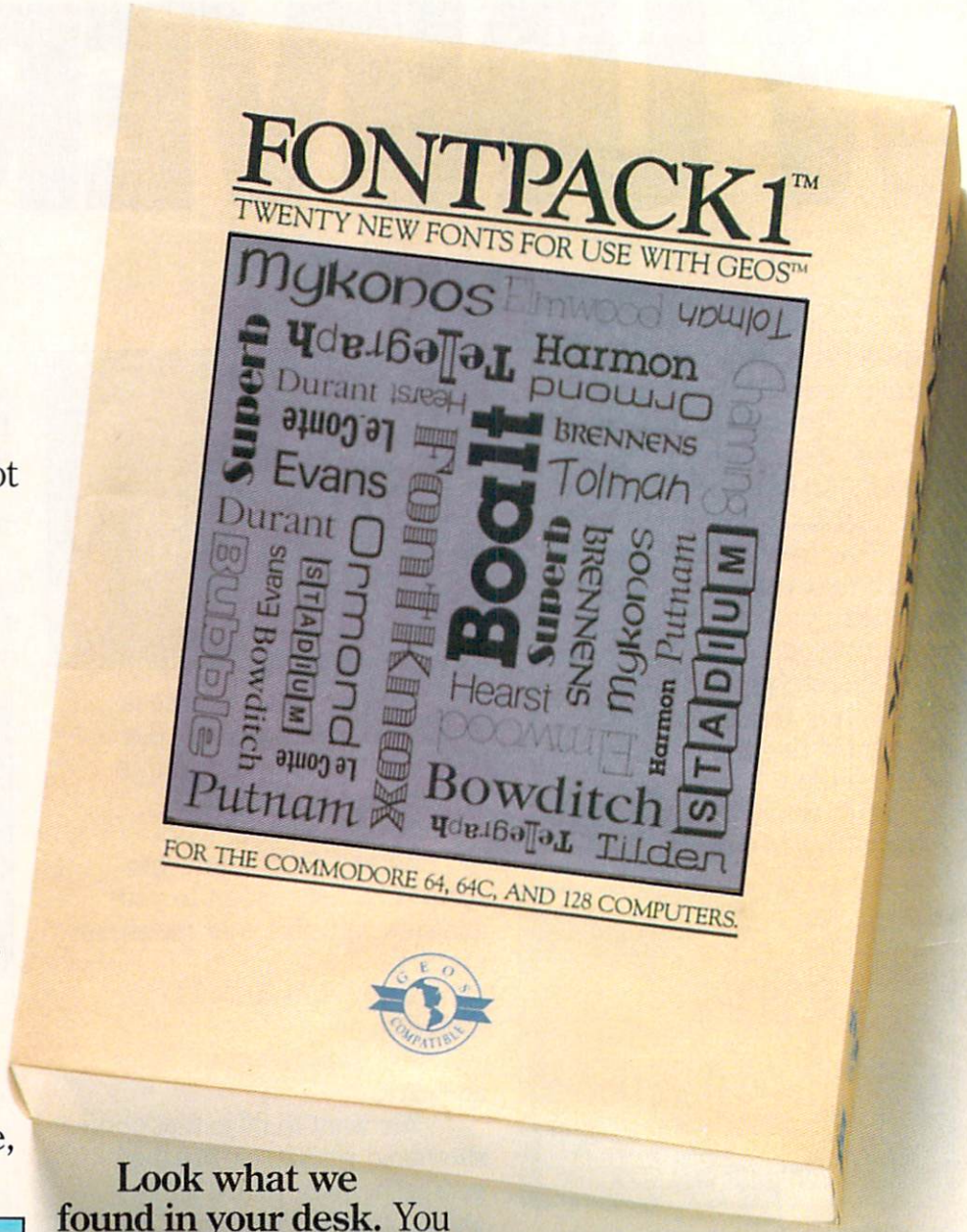

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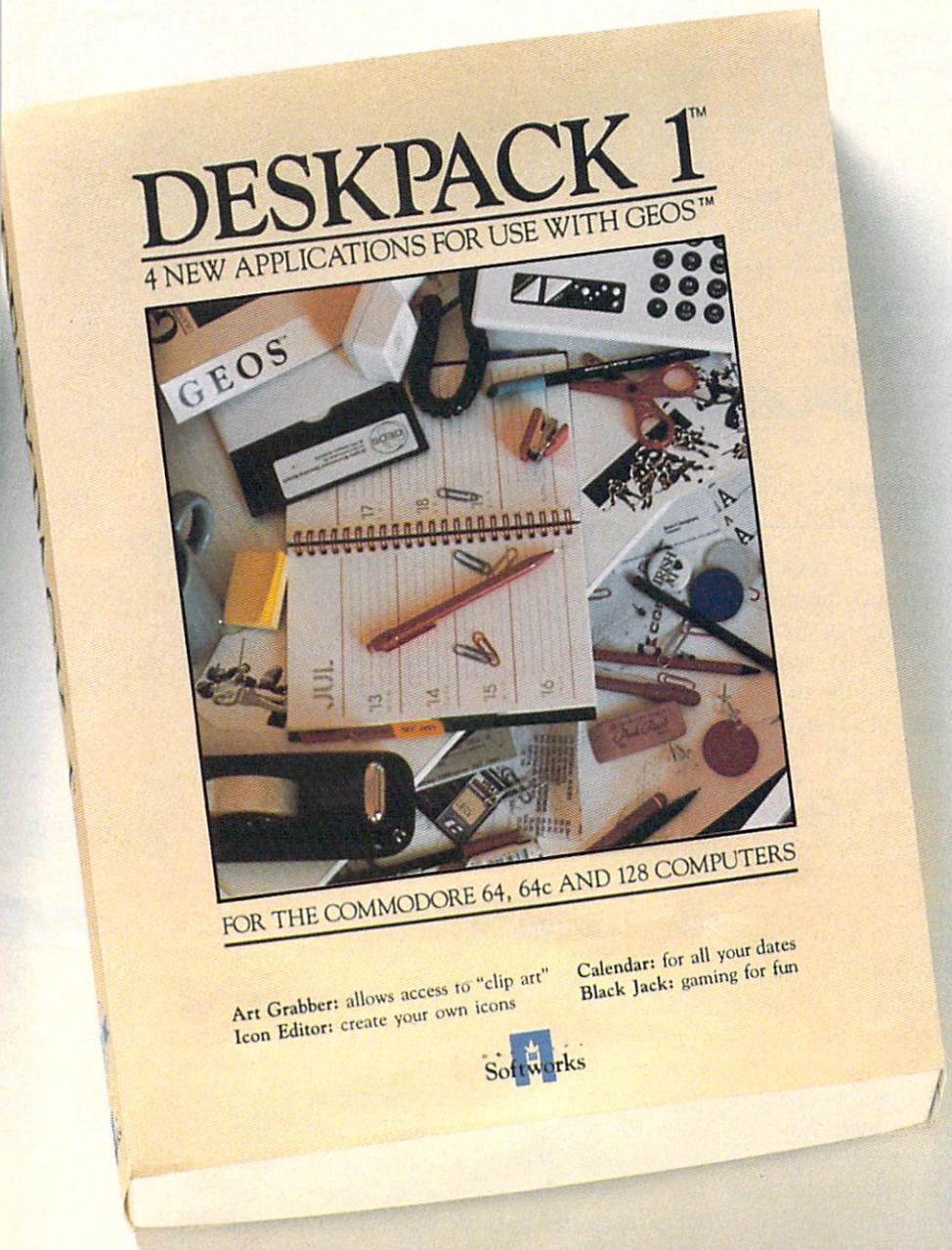
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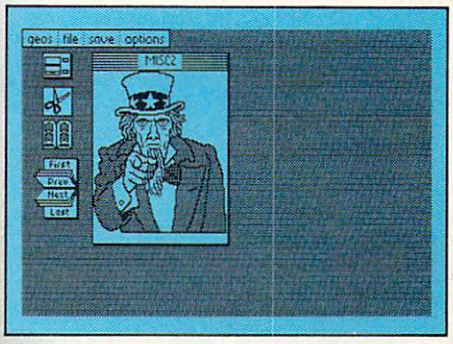

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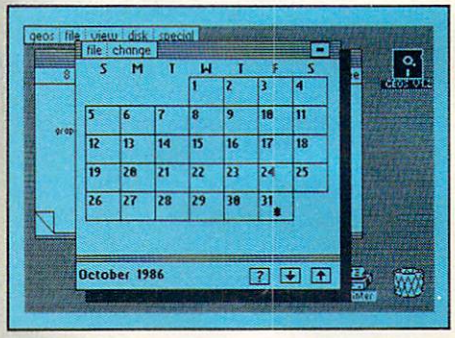

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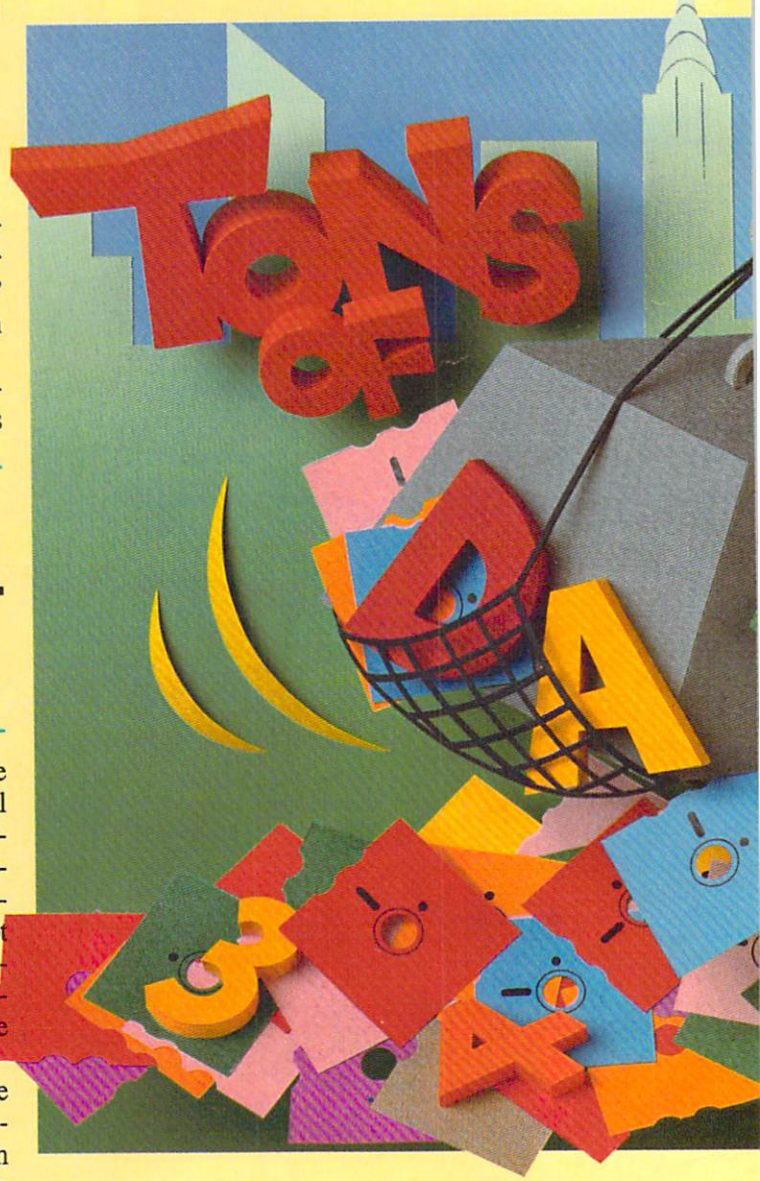

Data file handling is one aspect of computer programming which many people avoid for one reason or another. The concept of "files" is often deemed mysterious or difficult. In fact it is neither, and this month we will prove it.

In the October *Rupert Report* we converted our computers into digital oscilloscopes. We looked at the inputs to the computer's analog-to-digital circuitry on a real-time basis. That is, the display on the screen was the actual value of the input at that instant. One significant advantage of digital oscilloscopes over their analog counterparts is the ability of digital scopes to record the incoming signal values for future reference and for further "not in real time" processing. This month, we will investigate the use of sequential disk files for storing and recovering numerical data. That way we can accumulate information and process it at our convenience.

Files are simply collections of data. Program files are familiar to everyone who has ever saved or loaded a program. Sequential files are slightly different in format from program files, but we need not be concerned about the file structure. BASIC provides commands to let us easily write data into a sequential file and read it back.

The name "sequential" comes from the fact that any data item is accessible only after reading through all items written before that one. Cassette files are naturally sequential in structure. The third program on a tape is reachable only after the recorder reads through the first two programs.

An alternative to sequential files is relative or random access files. The disk drive is capable of picking out various portions of the diskette in any order. With relative files, a program can call up the fortieth data item in the file without looking at any other items. On the other hand, a program can read the fortieth data item of a sequential file only by first reading the preceding thirty-nine.

For real-time data collection, the use of sequential files is not a disadvantage. If the data items must be randomly accessed in order to process them, we can read the data from the disk into arrays in memory which will allow random access.

THE ART OF DATA COLLECTION

If you wished to monitor the amount of light reaching one side of your house over a period of several weeks, you might set up your computer as a data logger. You could adapt the photocell arrangement we used last month and write a program to read a light intensity value into the computer once every half hour, for example. If you were interested in more rapid fluctuations in brightness, you could program the computer to read the photocell as quickly as possible.

This incoming data must be stored somewhere. The two most common storage areas are random access memory (RAM) and diskettes. If the quantity of data is not too large, and if the computer will not be shut off before the data can be interpreted or processed, a numerical array in RAM would work fine. Variable storage RAM in the C-128 is limited to an array of roughly 32,000 integer numbers, and it is much less than that on the C-64. Integers in an array use two bytes apiece, and the C-128 has on the order of 64,000 bytes of variable storage.

CONSTRUCTION: AJIN

If a BASIC program brings in ten photocell readings per second, C-128 RAM could store approximately one hour's worth of integer data in an array. If more readings are needed, the present readings must be processed first or written to disk to make room.

The 1541 format, single-sided disk stores roughly 170,000 bytes. At first glance, this seems like nearly three times the storage capacity of variable RAM. In actuality, looks are deceiving. Unfortunately integers are not stored on disk as efficiently as in RAM arrays. Numeric data is stored in ASCII format on disk. For example, the integer "125" takes up six bytes in a disk sequential file. It looks like this:

disk data	>	32	49	50	53	32	13
meaning	>	sp	1	2	5	sp	cr

There is a space (CHR$(32)) stored ahead of the 1, then the three digits, followed by another space, and a carriage return (CHR$(13)) which separates this integer from the next one.

An integer such as 12,345 uses only two bytes of a RAM integer array, but it fills eight bytes of a sequential file. The array stores integers ranging from −32768 to +32767 in hexadecimal format; for example, 12,345 in hex is stored as the two bytes 30 39, since $3039 equals 12345. (The leading dollar sign indicates a hexadecimal or base-16 number.) Adding the two spaces and the carriage return to the 5 digits brings the ASCII character total to eight needed to store 12,345 in a disk file.

So why use the disk for data storage? The main reason is that the disk is non-volatile. That means the data is still around even after the power to the computer is shut off. Also, several disks may be used to accumulate several days' worth of data. The program to analyze the data would read from one disk, perform the analysis, and request the next disk to be inserted.

Disk storage is not foolproof however. If the power goes off before a disk file has been properly closed, some or all of the data may be inaccessible. The only way to avoid

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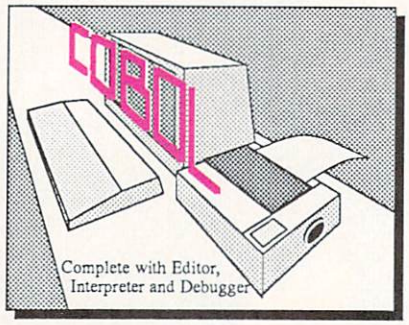

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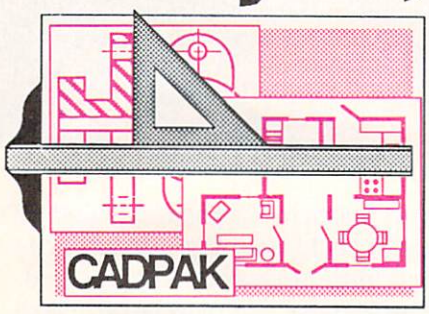

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power failure related data losses is to use a battery backed up, uninterruptible power supply (and, yes, even they have been known to fail).

With the 1571 disk drive using double-sided disks, the data storage capacity is essentially twice as great as the single-sided drive. Keep in mind that with a single disk drive system it is best to fill only part of a diskette with raw data if the data is to be processed (sorted, filtered, and so forth) and saved. That way there is room for the computer to store the processed data on the same disk. Swapping diskettes during processing is possible but cumbersome.

When time is no object, a cassette tape file might be considered for storing large amounts of raw data. The procedures for using tape are essentially the same as those we will discuss below for disk storage. For the details, you are on your own. (Once a person has used a disk drive, he generally wants to have as little as possible to do with standard tape storage, and rightfully so. Cassette storage is to computers as first gear is to cars. They are fine for starting out, but to cover a significant distance in a reasonable time, you need something else.) Generally disk storage, even with multiple disks, is a better approach than using cassettes.

READING, WRITING, AND FILES

All it takes to create a sequential disk file are three steps:

1. Open the file
2. Write to the file
3. Close the file

The BASIC 7.0 implementation to these steps is not much more difficult than their statement. The corresponding commands to put the numbers 1 through 100 into a sequential file called "NUMBERS" are simply:

```
1 DOPEN#8,"NUMBERS",W
2 FOR N=1 TO 100 : PRINT#8,N : NEXT N
3 DCLOSE
```

On the C-64, BASIC 2.0 requires a few more "things" and has a slightly different syntax, so the three steps are thus:

```
1 OPEN 8,8,8,"NUMBERS,S,W"
2 FOR N=1 TO 100 : PRINT#8,N : NEXT N
3 CLOSE 8
```

Line 1 in each case needs a little explanation. Opening a file allows the computer to get prepared for the data which will be stored in the file. The 8's following each type of OPEN statement in the two examples are labels called "logical file numbers." The computer prefers numbers to names. When you tell the computer to PRINT a value into the file in line 2, you refer to the file by its number, not by the filename "NUMBERS".

Any number from 1 to 127 may be used for the logical file number. I used 8 for the C-128 from habit since the C-64 requires two other numbers after the OPEN statement. The middle number in the C-64 version must be an 8 to

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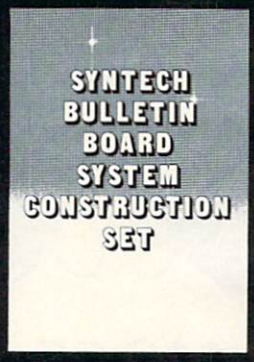

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refer to the first disk drive. Rather than remember which number is which, I simply use all 8's since that works. If we were writing data to several files at a time, we would open each one separately with its own filename and its own logical file number. The third number in the C-64 version OPEN statement must be between 2 and 14, and it must be different for two files at the same time.

The "S" stands for "sequential" and is implied in BASIC 7.0. The "W" is required in both versions of BASIC to indicate that we will write to the file. Notice that one W is inside the quotation marks, and the other one is outside.

The PRINT# statement does the writing. *Do not* put a space between the T and the #, and do not use the question mark abbreviation for this statement. "?#" and PRINT #" do not generate the same token as "PRINT#". The PRINT# (read "print number" or "print pound") statement writes to disk files in about the same way that PRINT writes to the screen. If we put a semicolon at the end of line 2, each number would be written without a carriage return after it. Unfortunately that makes it harder to read the individual numbers back.

Reading the numbers we have just written is also a three step process:

4 Open the file
5 Read from the file
6 Close the file

Once again, there is nothing very difficult or involved. The BASIC 7.0 (C-128) implementation looks like this:

```
4 DOPEN#8,"NUMBERS"
5 DO : INPUT#8,X : PRINT X : LOOP UNTIL
ST=64
6 DCLOSE
```

and here is the BASIC 2.0 version:

```
4 OPEN 8,8,8,"NUMBERS,S"
5 INPUT#8,X : PRINT X : IF ST<>64 THEN G
OTO 5
6 CLOSE 8
```

The "S" in the OPEN statement is optional and may be used in the BASIC 7.0 version if desired. The INPUT# statement works the same way as the more familiar INPUT statement. Line 5 causes the computer to read up to the first carriage return from the file associated with logical file number 8, the "NUMBERS" file. In general, to read data from a file, the format of the INPUT# statement should be the same as the PRINT# statement which wrote it. The PRINT statement merely puts this data onto the screen so that we know the program is working. Instead of the PRINT statement we could put additional computational statements here, if desired.

CHECKING STATUS

After the last value was written and the file was closed in lines 1 through 3, the computer added a special character to identify the end of the file. BASIC uses a special status variable ST to identify the outcome of input and output (I/O) operations such as to the printer and the disk. As long as everything is normal, the value of ST is 0.

Once the computer reads the last value in the file, it sets the value of ST to 64. Line 5 in both programs checks the value of ST to decide whether to go back for more data.

There is one special consideration about the ST variable. It can be read only once to indicate the status of each I/O operation. Once it is read, it is reset to zero. Therefore if several parts of a program need to know the value of ST for a given I/O operation, its value must be read once and stored in a separate variable. We'll see an example of this later.

One further caution. If for some reason the program to write or read disk files is interrupted and the "disk drive active" light is left on, you should close any files which were opened. On the C-128 simply type DCLOSE to close all open files. On the C-64 you must type CLOSE n for each logical file number n which is open. The drive light should then go off.

TAKING CARE OF ERRORS

The programs *Datawriter* and *Datareader* are meant to be models for creating your own file access programs. There are versions for the C-128 and for the C-64 beginning on page 127). If you understand the simple examples above, these programs should not be difficult to interpret. The line numbers for the two versions are the same, so our discussion will apply to both versions, except as noted.

The filename may be stored in a variable rather than being given directly. Notice the syntax in line 30 for using

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the variable filename F$. In addition to the I/O status variable ST, the C-128 has another set of special variables, DS and DS$, which store information about the disk drive status. If our attempt to open a file for writing fails, DS will have a code number identifying the problem. DS$ includes the code number as well as an error message and the faulty track and sector if relevant.

The corresponding drive status function on the C-64 involves opening a special file for the disk drive command channel. The drive sends its status to the computer through this channel which is number 15. The first two quantities it transmits are the error number and the error message. These are identical to DS and DS$. Line 40 in the C-64 version shows how to access these values. In essence our program must put the values into DS and DS$. The C-64 computer doesn't do that for us.

Notice that lines 40 and 220 read the drive status error number DS and store it in another variable DD. That way, the error handling routines in lines 1000 and 2000 can also reference the value. Recall that the values are reset each time they are read.

What could cause a disk drive error when line 30 in *Datawriter* opens the output file? The most common causes are that a file with the given filename already exists on the disk, or that the disk hasn't been formatted (use the NEW or HEADER commands), or that the disk drive door is open.

If an error has occurred in opening the file to be written, the program branches to the error handler routine in line 1000. The first thing it does is to close the open file(s). If the error resulted from the file already existing on the disk, DS and DD have a value of 63, and the program branches to line 1030. If the value of DD is not 63, the status variable and the error message are displayed to help the operator figure out the problem, and the program ends.

If the file to be written already exists, the program allows the user to write over (scratch) the old file and to replace it with the new one, or else he may specify a new filename.

If in *Datareader* a drive status error occurs, the most likely reason is that the specified file does not exist on the disk. The user is allowed to specify a different filename or simply to press the RETURN key to exit the program. On the C-128 version, the user may request that the disk directory be displayed so he can see which files exist.

In both programs, the status is checked after each INPUT# or PRINT# statement. If ST is not zero, then something went wrong during the I/O operation, such as the disk door being opened or the drive being unplugged. A status value of −128 means the drive is not present or not ready.

The main loop beginning in line 90 of *Datawriter* simply reads the jiffy timer and writes the square of that value to the file "TIME1." This operation is performed 100 times as controlled by the variable N. You could easily replace line 100 with T2=POT(1) to read the light intensity on a photocell plugged into the C-128's paddle port as described last month. The main loop might be timer-controlled so that the keyboard or an input port is read once every hour for example. A statement comparable to that in line 110 is all that is needed to store data onto the disk.

Datareader retrieves the squared jiffy clock values one by one from the disk file if you specify the filename "TIME1." Each value is sequentially numbered and displayed on the screen. Also the difference between the present value in D and the previous value (saved at line 280 in D0) is calculated and displayed. This is merely to show how the incoming data may be processed. Notice that the sequential numbers are displayed as the data is read from the disk. There is no need to store these numbers in the disk file.

You may change the default filenames in lines 20 and 200. The "XX" in line 200 causes the program to automatically branch to the error handler so the actual filename can be entered (assuming your disk does not contain a file called "XX".) You can add additional error handling if necessary, although nothing more is needed to take care of most problems. (Try opening the disk drive door during the file access just to see what happens.)

What you put into the main loops is up to you. Our simple model did not require the use of arrays since only two data values were referenced at a time (the current reading and one previous reading). In future columns we will discuss the use of RAM arrays for processing the data, and we will see some more advanced file reading and writing capabilities. The *Datawriter* and *Datareader* models should help you to implement most data logging applications.

Hopefully by now you are convinced that sequential file operations are not really very difficult. If not, reread this article, study the examples, try them, and then modify them. Very soon you will agree that disk data files are as easy as 1, 2, 3. ☐*SEE PROGRAM LISTINGS ON PAGE 127*

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THE SHADOW KNOWS

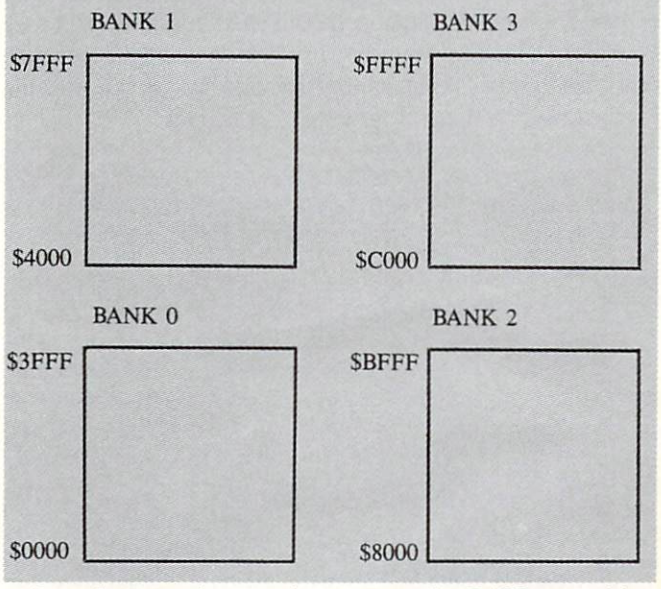
Exposed: Secrets of Programming Sprites Using the Commodore 128's Shadow Registers

By Mark Andrews

There's a secret to programming sprites on the Commodore 128—and it isn't revealed in the official *C-128 Programmer's Reference Guide.* In fact, to my knowledge, it hasn't been revealed anywhere. But it soon will be—in this series of two columns.

The secret, in a nutshell, is this: Deep in the Commodore 128's memory banks, in an undisclosed and totally undocumented location, is a set of "shadow registers" that determine where sprites will appear on the screen in assembly language programs.

FIGURE 1
The Four Video Banks in Each Memory Bank



In order to write a sprite program in C-128 assembly language, it is essential to know the addresses and functions of these shadow registers. Without them, you cannot program a sprite in C-128 assembly language. Yet, strangely enough, these registers are not mentioned in the *C-128 Programmer's Reference Guide,* a 744-page technical manual commissioned by Commodore and published by Bantam. And, to date, I have not found them listed in any other book on C-128 assembly language.

EXPLORING THE SHADOWS

But in this month's and next month's column, we'll actually use the C-128's secret sprite registers to create a sprite and animate it on the screen. We'll do this in an assembly language program that has been divided into two parts, called SPRITE1 (on page 122) and SPRITE2 (next month).

The SPRITE1 and SPRITE2 programs look and work much like a C-64 program that appeared in this column several months ago. Like their predecessor, they display part of a message on the screen in headline-sized characters, and then use a sprite to complete and animate the message. But don't let these similarities fool you. SPRITE1 and SPRITE2 were written strictly for the Commodore 128; because they make use of shadow registers and other special features of the C-128, they will not work on the 64.

Before we start typing and assembling SPRITE 1, it would probably be a good idea to take a look at some of the graphics features of the C-128. So here goes:

THE C-128'S BANKED ARCHITECTURE

As we have seen in previous columns, the Commodore 128 has two 64K blocks of RAM—sometimes labeled RAM block 0 and RAM block 1—and one 48K block of ROM. But the C-128's VIC-II video chip, which controls sprites as well as screen graphics, can access only 16K of memory at a time. So each of the C-128's 64K RAM blocks has been divided into four video banks, each containing 16K of memory. And a simple method has been provided for telling the VIC-II which video bank it must access to get the data it needs to generate a screen display.

To direct the VIC-II chip to the proper video bank, all a programmer has to do is set two bits in a certain C-128 register: specifically, bits 0 and 1 of memory register $DD00, sometimes referred to as Complex Interface Adapter Register No. 2, or CI2PRA. Figure 1 shows how each of the C-128's two blocks of RAM can be divided into four 16K video banks. And Figure 2 shows how bits 0 and 1 of the CI2PRA register can direct the VIC-II chip to any desired video bank within either of the C-128's

FIGURE 2
Selecting a Video Bank Using Register $DD00

Video Bank	Address Range	$DD00 Setting	Hexadecimal Equivalent
0	$0000-$3FFF	XXXXXX11	$03
1	$4000-$7FFF	XXXXXX10	$02
2	$8000-$BFFF	XXXXXX01	$01
3	$C000-$FFFF	XXXXXX00	$00

64K blocks of RAM.

HOW TO USE THE C12PRA REGISTER

The C12PRA is an important register in C-128 graphics programs, because it is often necessary to move the block of memory that is accessed by the VIC-II. For example, in the SPRITE1 program, there are three large blocks of graphics-related data: a high-resolution screen, a character set that has been copied from ROM into RAM, and a sprite. Since data from all three of these memory blocks must appear on the screen at the same time, the C-128's VIC-II chip has to have access to all three simultaneously. And that means that all three blocks of data have to be situated in the same 16K video bank in the same 64K block of memory.

FIGURE 3
Altering Register $DD00 by a Masking Operation

```
LDA C12PRA
AND #$FC ;CLEAR BITS 0 AND 1
ORA #$02 ;USE VIDEO BANK 1
STA C12PRA
```

This condition would not be difficult to fulfill if the VIC-II chip were set to access an empty 16K block of RAM at power-up time. Unfortunately, this is not the case. When the C-128 is turned on, the VIC-II chip is set to access video bank 0 in RAM block 0—and, as it turns out, this is a very crowded block of RAM. It contains Page Zero, the 8502 stack, some RAM used by BASIC, and a big chunk of the C-128's operating system RAM—in all, over 7K of RAM that would be difficult, if not impossible, to use for storage of graphics data.

Fortunately, it is not difficult to rearrange things so that the VIC-II can access a less crowded segment of RAM. In SPRITE1, for example, the C12PRA chip is used to redirect the VIC-II chip to video bank 1 (memory addresses $4000-$7FFF) in RAM block 0.

In lines 412 through 418 of SPRITE1, the 8502 is instructed to access memory bank 15, where the C12PRA register ($DD00) resides. Then bits 0 and 1 of the C12PRA register are set to access video bank 1. A masking operation is used for this procedure, as illustrated in Figure 3.

THE VMCSB REGISTER

Before the VIC-II chip can produce a screen display, it must also be told exactly where to go in memory to get the screen data and character data which it needs to produce a screen display. In a C-128 program, screen and character data may be placed anywhere the programmer desires—within these limitations:

- A high-resolution screen map must start on a 1K boundary—that is, at a memory address divisible by $0400, or 1024 in decimal notation.
- When a full or partial character set is copied from ROM into RAM, its starting address in RAM must be situated on a 2K boundary—that is, at a memory address divisible by $0800 (or 2048 in decimal).
- If a RAM-based character set is used in a program, both the screen map and the relocated character set must reside in the same 16K video bank in the same 64K block of RAM.

THE C-128'S SHADOW REGISTERS

If you have written programs for the C-64, you may know that it has one memory register—often called the VMCSB register—that serves as a double function in high-resolution programs. VMCSB, situated at memory address $D018, is an eight-bit register that is used as two four-bit registers. The high byte of $D018 tells the VIC-II chip where it can find data that it needs to generate a screen map. And the low byte directs the VIC-II chip to the segment of memory that contains character data.

In the Commodore 64, setting the MVCSB register is a very straightforward operation. But in the C-128, VMCSB cannot be accessed directly from a user-written program. Instead, it must be addressed through two "shadow registers"—one used when the C-128 is in its 40-column text mode, and one used when the computer is generating high-resolution graphics. In the C-128's 40-column text mode, memory register $A2C is the VMCSB shadow register. In high-resolution graphics mode, the VMCSB's shadow register is memory address $A2D. These two registers are not the secret sprite registers that were mentioned at the beginning of this column. But they work in a similar way: they provide the programmer with access to other registers that are not directly addressable from user-written programs.

FIGURE 4
Text and Low-Resolution Screen-Map Addresses (store starting address code in $A2C as follows:)

Bits to Set	Hex No.	Starting Addresses: Video Bank 0	Video Bank 1	Video Bank 2	Video Bank 3
1111XXXX	$F0	$3C00	$7C00	$BC00	$FC00
1110XXXX	$E0	$3800	$7800	$B800	$F800
1101XXXX	$D0	$3400	$7400	$B400	$F400
1100XXXX	$C0	$3000	$7000	$B000	$F000
1011XXXX	$B0	$2C00	$6C00	$AC00	$EC00
1010XXXX	$A0	$2800	$6800	$A800	$E800
1001XXXX	$90	$2400	$6400	$A400	$E400
1000XXXX	$80	$2000	$6000	$A000	$E000
0111XXXX	$70	$1C00	$5C00	$9C00	$DC00
0110XXXX	$60	$1800	$5800	$9800	$D800
0101XXXX	$50	$1400	$5400	$9400	$D400
0100XXXX	$40	$1000	$5000	$9000	$D000
0011XXXX	$30	$0C00	$4C00	$8C00	$CC00
0010XXXX	$20	$0800	$4800	$8800	$C800
0001XXXX	$10	$0400	$4400	$8400	$C400
0000XXXX	$00	$0000	$4000	$8000	$C000

USING MEMORY REGISTER $A2C

With text and low-resolution programs written for the C-128, the default screen map—the block of memory that is used as a screen map when the computer is turned on—extends from $0400 to $07FF in memory bank 0. And the ROM block that holds character data at power-up time

FIGURE 5
RAM Character Set Starting Addresses in Text Mode
(store starting address code in $A2C as follows:)

Bits to Set	Hex No.	Starting Addresses Video Bank 0	Video Bank 1	Video Bank 2	Video Bank 3
XXXX111X	$0E	$3800	$7800	$B800	$F800
XXXX110X	$0C	$3000	$7000	$B000	$F000
XXXX101X	$0A	$2800	$6800	$A800	$E800
XXXX100X	$08	$2000	$6000	$A000	$E000
XXXX011X	$06	$1800	$5800	$9800	$D800
XXXX010X	$04	$1000	$5000	$9000	$D000
XXXX001X	$02	$0800	$4800	$8800	$C800
XXXX000X	$00	$0000	$4000	$8000	$C000

extends from $D000 to $DFFF in bank 14. In addition, the C-128 has a color map that is always in the same place when the 128 is in 40-column text mode. This map extends from $D800 to $DBFF in bank 15.

When the C-128 is in its 40-column text mode, memory register $A2C can be used to relocate screen data, character data, or both. The high nibble of $A2C tells the VIC-II where it can find a screen map, and the low nibble points the VIC-II to the segment of memory in which character data is stored.

In order for memory register $A2C to work properly, of course, the C12PRA register ($DD00) must be set to access the video bank in which screen and character data are stored. Figures 4 and 5 show how the VIC-II, C12PRA, and $A2C registers can be used together to generate a text or low-resolution screen display.

USING MEMORY REGISTER $A2D

When the Commodore 128 is placed in its high-resolution mode, the block of RAM used as screen memory starts by default at memory address $1C00 in memory bank 0. The first 1024 bytes of this memory block—the portion that extends from $1C00 to $1FFF—are used as a color map. The data used to bit-map the screen extends from $2000 to $3FFF.

When a hi-res screen is to be displayed, memory register $A2D can be used to relocate both the RAM block used as a color map and the RAM block that is used as a bit map. The high nibble of $A2D tells the VIC-II chip where it can find the color map that it needs to generate a bit-mapped screen. And the low nibble directs the VIC-II to the starting address of the high-resolution screen map. Since it takes 8000 bytes of memory to produce bit-mapped display, however, only one bit in the $A2D register—bit 3—is used to direct the VIC-II chip to the starting address of a high-resolution screen map.

Memory register $A2D, like memory register $A2C, works hand in hand with the C12PRA register ($DD00).

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For $A2D to work properly, the C12PRA register must be set to access the video bank in which both a color map and a high-resolution screen data are stored. Figures 6 and 7 show how the VIC-II, C12PRA, and $A2D registers can be used together to generate a bit-mapped high-resolution display.

FIGURE 6
High-Resolution Color-Map Addresses
(store starting address code in $A2C as follows:)

Bits to Set	Hex No.	Starting Addresses: Video Bank 0	Video Bank 1	Video Bank 2	Video Bank 3
1111XXXX	$F0	$3C00	$7C00	$BC00	$FC00
1110XXXX	$E0	$3800	$7800	$B800	$F800
1101XXXX	$D0	$3400	$7400	$B400	$F400
1100XXXX	$C0	$3000	$7000	$B000	$F000
1011XXXX	$B0	$2C00	$6C00	$AC00	$EC00
1010XXXX	$A0	$2800	$6800	$A800	$E800
1001XXXX	$90	$2400	$6400	$A400	$E400
1000XXXX	$80	$2000	$6000	$A000	$E000
0111XXXX	$70	$1C00	$5C00	$9C00	$DC00
0110XXXX	$60	$1800	$5800	$9800	$D800
0101XXXX	$50	$1400	$5400	$9400	$D400
0100XXXX	$40	$1000	$5000	$9000	$DC00
0011XXXX	$30	$0C00	$4C00	$8C00	$CC00
0010XXXX	$20	$0800	$4800	$8800	$C800
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0000XXXX	$00	$0000	$4000	$8000	$C000

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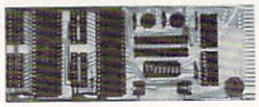

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FIGURE 7
High-Resolution Screen-Map Addresses
(set bit 3 of $A2D as follows:)

Setting of Bit 3	Hex No.	Starting Addresses: Video Bank 0	Video Bank 1	Video Bank 2	Video Bank 3
XXXX1XXX	$08	$2000	$6000	$A000	$E000
XXXX0XXX	$00	$0000	$4000	$8000	$C000

In the SPRITE1 program, the block of memory used as a color map starts at $5C00, and the block used as a screen map starts at $6000. It takes only two lines of code—lines 423 and 424—to point the VIC-II chip to the two banks of memory that will be used to color-map and bit-map the program's high-resolution screen. Register $A2D is labeled SVMCSB (for "shadow MVCSB") in SPRITE1, and the two lines that point the VIC-II chip to the program's color map and bit map are reproduced in Figure 8.

FIGURE 8
Setting the SVMCSB Register

```
LDA #$78
STA SVMCSB
```

CREATING GIANT CHARACTERS

The SPRITE1 program paves the way for the SPRITE2 program by printing a giant-sized message on the C-128 screen. And it accomplishes this feat without requiring the programmer to create, purchase, or otherwise acquire a special character set; it simply copies the C-128's character set into RAM, and then blows each character up to four times its normal size. And, since each character is stored in RAM in its original size, the giant characters produced by SPRITE1 do not require a giant-sized chunk of memory.

Another noteworthy feature of SPRITE1's character-generating module is its simplicity. To copy the C-128's character set into RAM, the program uses an algorithm much like one presented in this column a few months ago. As each character is called up to be displayed on the screen, each dot is copied into screen memory twice, doubling the character's width. And each scan line in each character is also placed in screen memory twice, doubling the character's height. Result: quadruple-size screen characters, all produced in lines 267 through 317 of the SPRITE1 program.

SPRITE1 was written on a Commodore 64 using a *Merlin 64* assembler. With minor modifications, though, it can be typed, assembled, and run using any C-64 or C-128 assembler. Type it, assemble it, and execute it, and you'll see it display part of a headline-size message on your C-128 screen. And be sure to save the program on a disk; next month, we'll add a sprite that will complete and animate the display. □

SEE PROGRAM LISTING ON PAGE 122

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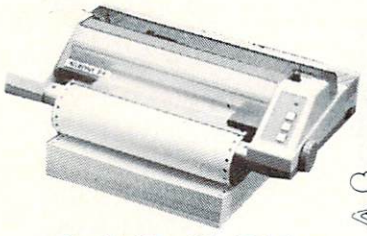

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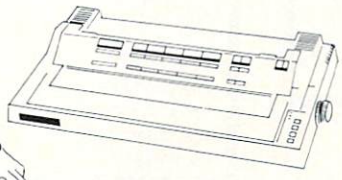

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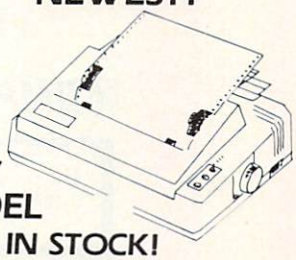

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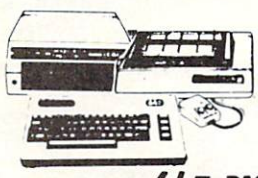

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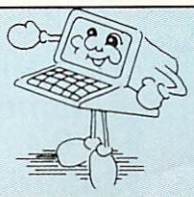

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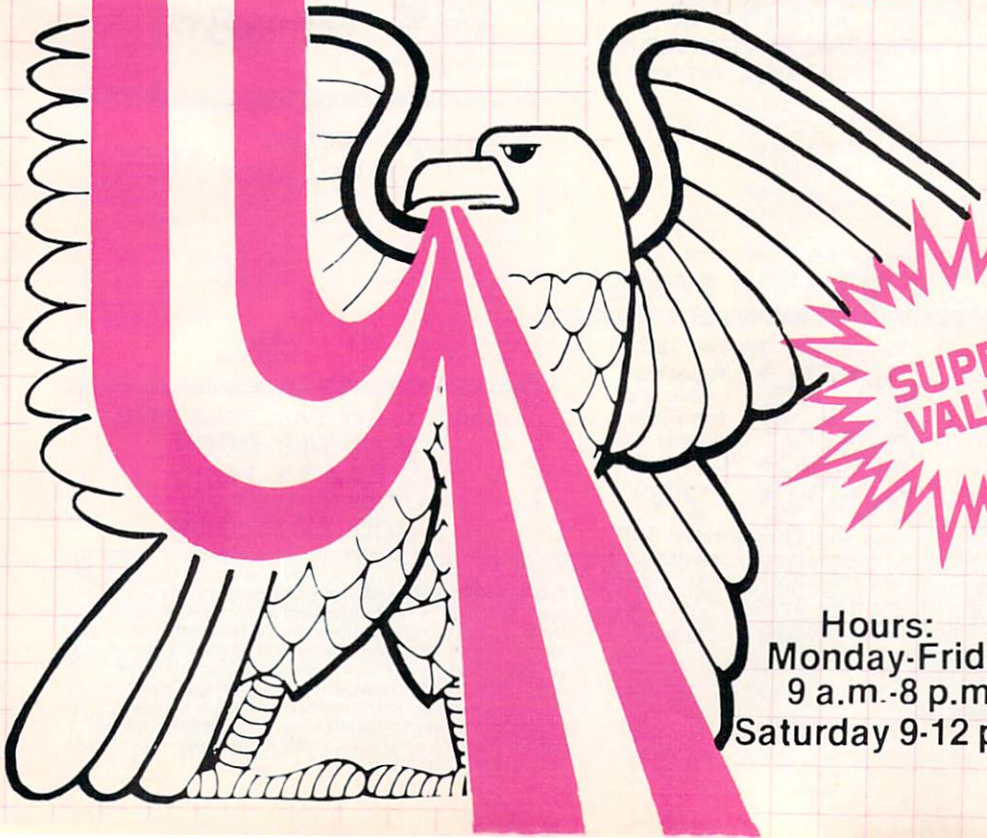

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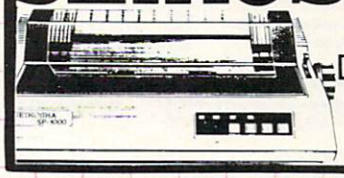

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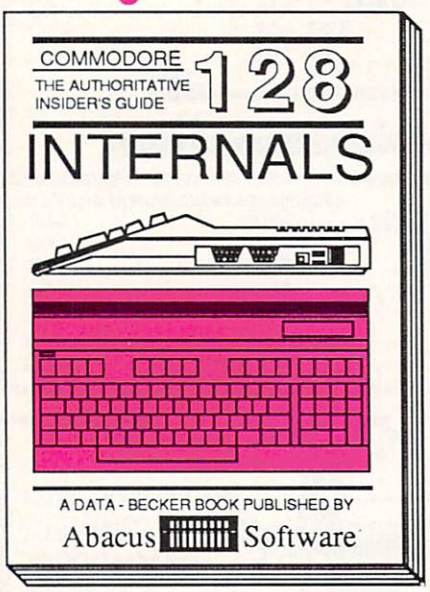

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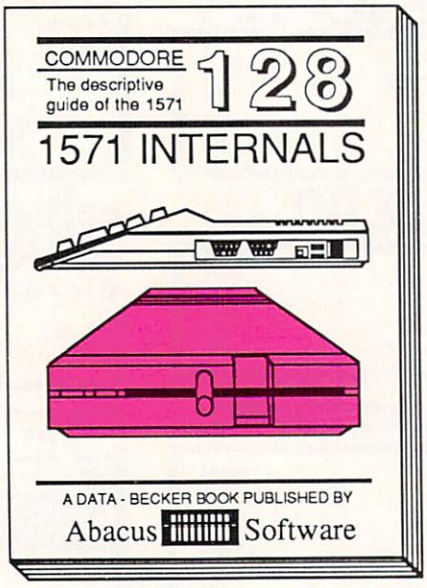

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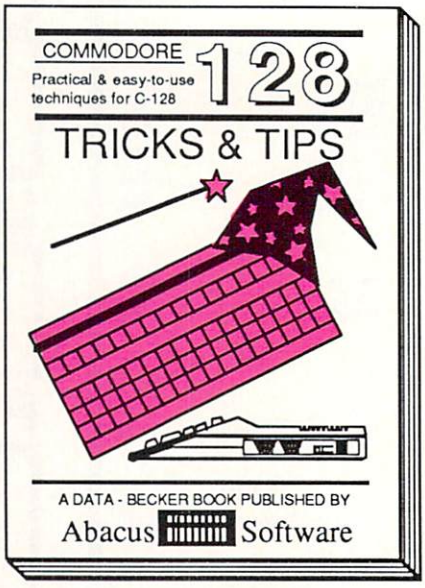

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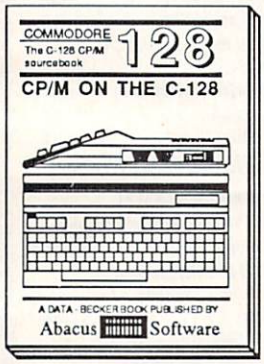

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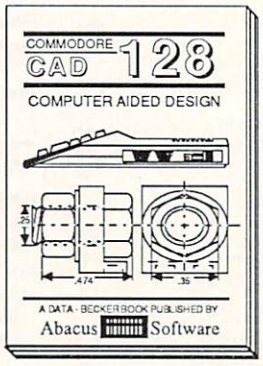

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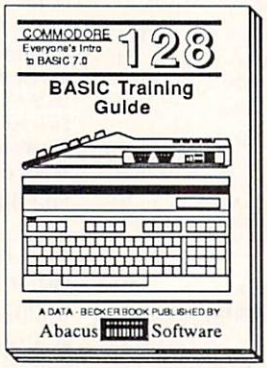

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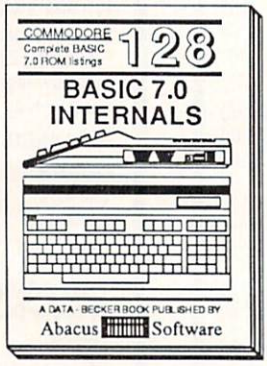

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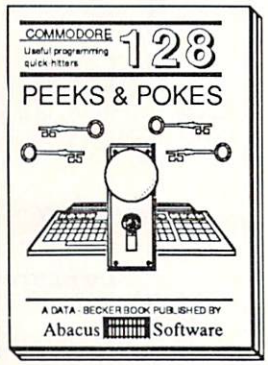

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TELEPORTER

For the C-64

By

Cleveland M. Blakemore

You walked up the boarding ramp with the ad clutched in your hand, crisp in your new cadet pressure suit. As you passed through the ship entrance, a gibbering lunatic was escorted out of the ship by two spaceport MPs. He glanced at you wildly from his straitjacket, restrained by the two large officers on either side.

"Fry them all. It's the only way to be sure you'll keep the freeloaders off!" he said, giggling.

Once inside the ship, the wrinkled, prunefaced captain, Finch Legree, explained your responsibilities while he eyeballed your uniform for starch creases.

"Your job is simple, young man. Watch the instruments. Monitor the arrivals on the teleporter ramp. If you think we're being boarded by some hitchhiker, charge the teleporter grid and fry him into charcoal!"

You understood the captain's problem, of course. Aliens were notorious for sneaking on starships on the teleport beams just to avoid the price of a flight ticket. They even went to the trouble of sending a fake transmission announcing their arrival, complete with bioscan readings and images. But a good teleport specialist, one like you, could spot the inconsistencies between received and apparent readings and ferret out the imposters.

In the game of *Teleporter*, you stand before a 3-D picture of a control panel and a teleporter pedestal. Personnel from all walks of life materialize slowly in front of you. Before they arrive, you will get a prior transmission that will display a bioscan reading (B), a body temperature reading (T), and a waveform for that alien's correct brainwaves (R). You will also see a transmitted image of the alien that is supposed to arrive on your IMAGE screen. If at any time during his materialization, his bioscan or temperature reading fluctuates more than (.5) from normal, or his received waveform (R) seems to fluctuate from his normal one (W), press the space bar or joystick button on Port 1. The grid will electrify and the alien will be disintegrated.

Legree is also watching on his monitor while the alien beams onboard. If he seems to frown more than usual, it could indicate something is fishy. You have to get used to his personality to be able to judge.

You will monitor 20 arrivals, after which you will receive a rating from Captain Legree. If you have made more than six mistakes, Captain Legree will fire you from your post.

The first six or seven levels are pretty easy. Usually the alien will be the wrong type, or will have different colors on his uniform. After that it gets a bit more difficult. The game is a good test of intuition—the feeling of knowing something without understanding how you know it. Watch the readings and waveforms for too much variation. Keep an eye on Legree—if he frowns a lot, that's a good tip the alien is a fake.

Later on, the game gets very tricky. The ship's computer malfunctions. Screens flicker and shut off. Transmissions are garbled. Captain Legree goes to lunch. The image on your monitor may not be the right one for the alien that is boarding. The ship itself passes through meteor belts and radiation storms, causing the teleporter room to shake and buckle, making it harder to watch the screens. Captain Legree is a real miser, and he may even shut off some of your equipment himself to save energy.

At the end of 20 arrivals, you may be glad to resign your post. But I hope you will like the game—if you attain a perfect score, Legree will knight you a "Regular Ricky Rocket!"

The game is written entirely in BASIC, with a little ML to copy character data down. It uses several neat graphic tricks with sprites and sprite priorities to create the "Beam-on" effect, and has some gimmicks in it to make the ship shake. My favorite is switching to an undefined character set to create the effect of "electrifying" the teleporter grid. The undefined set consists of totally random bytes in character memory, making the screen "sizzle."

You should be able to type the game in one short sitting, and I hope you'll find it a very interesting piece both in programming technique and playability. □

SEE PROGRAM LISTING ON PAGE 130

DELUXE LIST

C-64 Program Prettification

By Mark Bersalona

BASIC programmers usually put several commands on each program line. This practice saves a few bytes of memory per program line and lets the program run slightly faster. However, it also makes the program listing difficult to read. How can we have the compactness of multiple statements on each line with the legibility of lines with single statements? *Deluxe List* solves this problem.

Deluxe List is a machine language routine stored as a BASIC loader. When the loader is run, the ML is wedged into the LIST routine. When a program is listed, *Deluxe List* looks for colons that are not within strings. All strings are assumed to begin and end with quotation marks, i.e., strings at the end of program lines must have close quotes. If it finds such colons, *Deluxe List* jumps to the next line, prints two spaces, and prints the next statement. If there are several statements in a line, *Deluxe List* prints each on a separate line.

As a bonus, the SHIFT key will freeze a listing. Unlike many other LIST-freezing utilities, the SHIFT key only pauses a LIST. It will not interfere with a running program.

HOW *DELUXE LIST* WORKS

The BASIC in the 64 has six main vectors starting at $300. The IQPLOP vector, ($306), is used by LIST to untokenize keywords. By changing the vector ($306) to point to *Deluxe List* or any other new routine, we can easily improve LIST. The end of *Deluxe List* jumps to $A71A, the address to which ($306) normally points.

HOW TO USE *DELUXE LIST*

The first listing on page 142, DELUXE LIST49152, puts *Deluxe List* in memory starting at location 49152 and activates it. When *Deluxe List* is activated it is important not to edit program lines with the screen editor. To see why, type in a program line with at least two commands (10 PRINT:PRINT for example). LIST the line with *Deluxe List* activated, edit the line with the screen editor, and hit RETURN. LIST the line again. The new program line is probably not what you expected. You can edit lines with single statements, or you can retype entire lines, but it is easier and safer to disable *Deluxe List*. SYS49152 will toggle *Deluxe List*, activating or disabling it.

Many machine language utilities also load into memory starting at 49152. The second listing on page 142, DELUXE LIST828, puts *Deluxe List* in the cassette buffer starting at location 828. SYS828 will toggle *Deluxe List* at this location. Note that tape use will overwrite *Deluxe List*.

Deluxe List is ideal for printing listings on paper. Be sure *Deluxe List* is activated before listing to a printer. □

SEE PROGRAM LISTINGS ON PAGE 142

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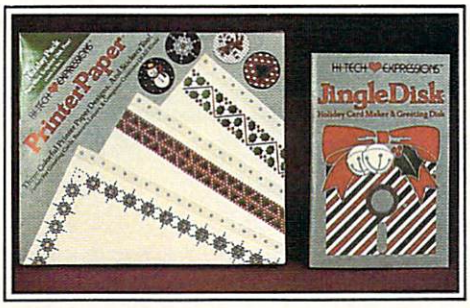

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128 RAM CHECK

By Buck Childress

I'll bet you're having a blast with your C-128. What an incredible amount of memory for those Paul Bunyan sized programs! Because it never seems to get full, chances are you'll never use all that RAM. If you're looking for something that will finally exercise those dormant bytes and at the same time make sure they're in working order, give *128 RAM Check* a whirl.

128 RAM Check will test the BASIC RAM in banks zero and one, which stretch from 7168-65279 and 1024-65279 respectively. These two memory banks comprise the RAM that gives you 122365 BASIC bytes free.

It also tests four additional areas of RAM in bank zero. They include the buffer for the cassette and disk autoboot (2816-3071), the RS232 input and output buffers (3072-3583), the sprite definition area (3584-4095), and the free RAM area (4864-7167). In addition to being used for sprite data and input/output, many machine language programs and subroutines reside in these areas. In case you're wondering, *128 RAM Check* initially loads into free RAM. After checking the sprite definition area, it relocates itself there in order to check the free area.

128 RAM Check works by attempting to store all values from 0 through 255 in each memory location. If successful, it moves to the next location. The area of RAM under scrutiny is displayed and a counter keeps you abreast of the current byte being tested. If all bytes in an area check out fine, you'll see "OK". Should a bad byte be encountered, "ERROR" is printed, along with the location of the byte. *128 RAM Check* then moves to the next area of RAM. When the various RAM areas in both banks have been checked, the test is over.

After saving a copy of *128 RAM Check*, run it. The loader will POKE the data into memory and check for errors. Now type SYS 4864 and press RETURN to check your RAM. Because the loader is erased during the test, be certain you have a good copy saved.

While *128 RAM Check* is running, you'll see a moving object at the top of your screen. This is a video display of the values being stored in each memory location. It appears to be moving because of the great speed of machine language.

128 RAM Check takes approximately 25 minutes to check bank zero and 60 minutes to check bank 1. (The bank 1 check requires extra manipulation, making it slower than the bank 0 check.) Because there are more than 125,900 locations to test, *128 RAM Check* must perform in excess of 32,200,000 PEEKs, POKEs, comparisons, and resulting subroutines in order to complete its task. If you don't want to watch it in action, you can let it zip along while you eat dinner or watch TV. Should you want to stop *128 RAM Check* before it's finished, RUN STOP/RESTORE will do the job.

When the test is complete, press the reset button, or turn the computer off then back on to reset it.

The 128 is a fabulous machine with a tremendous amount of RAM. Won't it be nice to know it's all working? □

SEE PROGRAM LISTING ON PAGE 136

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VIZASTAR for the C128

Vizastar, the integrated spreadsheet, database and graphics program that has the Commodore 64 world raving, is now available for the C128. It boasts 80 columns, and has over 40K of free memory in the spreadsheet. Those who already own Vizastar 64 will be pleased to know that your existing files can be read by Vizastar 128. Also, you can upgrade to the 128 version. Call us for details and pricing.

"The only other comparable product would be Lotus 1-2-3 for the IBM PC; nothing in the C64 world comes even close to the features of Vizastar."
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RUN Magazine, June 1985

"I scrutinized, tested and experimented with Vizastar extensively, but could find no weaknesses whatsoever. It is the most comprehensive, most flexible, most powerful and easiest to use integrated software package I've worked with."
Commodore Microcomputer, Sept/Oct 1985

"I use an IBM PC at work with Lotus 123. I feel Vizastar is just as good and in someways better than 1-2-3."
Steven Roberson, NC. End User

"I have used Multiplan and Superbase; both are good pieces of software, but are inadequate when compared to Vizastar."
Jim Mathews, WA. End User

"So good, I bought a second C64 and Vizastar for my office. A wild bargain! You've saved me from having to buy IBM and Lotus."
Philip Ressler, MA. End User

VIZAWRITE CLASSIC for C128

This is the new word processor from Vizastar's author, Kelvin Lacy and is the successor to Omniwriter, which he also wrote. All the features of Omniwriter are there, plus many significant enhancements, like auto pagination, on-line help, pull-down menus, full-function calculator and more. Up to 8 'newspaper-style' variable-width columns can help with newsletters.

Three different proportionally-spaced "near letter quality" fonts are also built-in for use with Commodore or Epson compatible printers. You can merge almost any other word processor file directly into Vizawrite, including Paper Clip and Omniwriter. Naturally, it is also compatible with Vizastar. At all times, what you see on the screen is exactly the way it will be printed out. Vizawrite can do mail-merges and has an integrated 30,000 word spelling checker that you can expand yourself.

PROGRAM SPECIFICATIONS

Both Vizawrite and Vizastar are written in 100% machine language and run in the 128's FAST mode, making it lightning fast. They require a C128 with 80 column color or monochrome monitor. Both come with a cartridge, a diskette, and a reference manual. Vizastar also includes a 50 page tutorial book. Both work with 1541 or 1571 disk drives.

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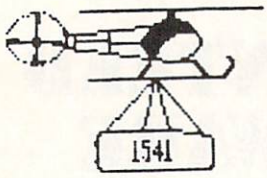

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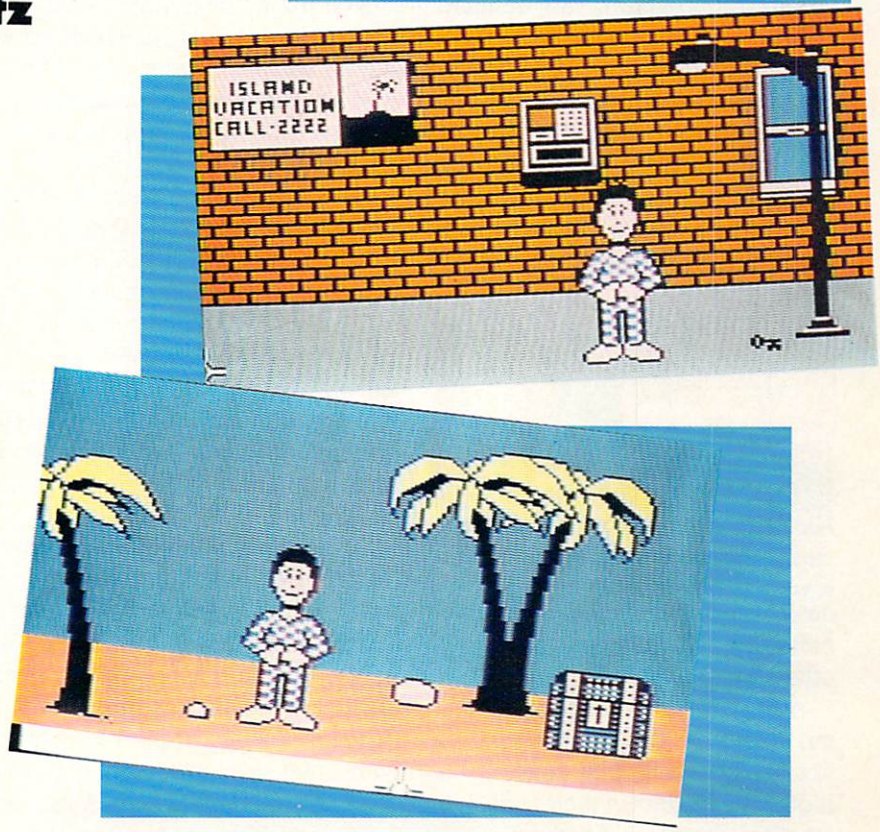


Each human participant in Lucasfilm/QuantumLink's **Habitat** *role-plays via an onscreen "avatar."* *READER SERVICE NO. 133*

The man who invented *Pong*, Sanders Associates' Ralph Baer, once said that the only three things worth doing with a home computer are entertainment, word processing, and telecommunications. This is probably a bit of an exaggeration, but there's no denying that these activities fill the majority of hours Americans spend with microcomputers in the home.

Combining gaming and telecommunications in one powerhouse package is a cherished dream that has been a long time turning into a reality. Computer gaming via modem is not a new concept, but technology has only reached the level needed to support a broad spectrum of games within the last year.

Online entertainment programs have existed almost as long as micros. Unfortunately, the quality of the games, especially the visuals, has been clearly inferior to the average piece of home computer leisureware.

The Source and CompuServe both offer a selection of online games, but entertainment is little more than a side-issue to these business-oriented operations. Most of their subscribers view the Source and CompuServe as productivity boosters and an economically attractive alternative to other modes of communication.

Though QuantumLink, which serves owners of the C-64 and C-128, is not the only entertainment-oriented network—PlayNET also emphasizes games—it is a striking contrast to rival networks. Parent company Control Video Corporation has targetted it squarely at the home market with a consequent emphasis on gaming, online chat, and hobby groups.

The Virginia-based service is introducing a brand new online game which represents the next great leap forward in entertainment telecommunications programs. *Habitat*, created by the fertile minds at Lucasfilm, is an authentic breakthrough which heralds the arrival of online gaming as a major part of the computer entertainment scene.

Although *Habitat* is still in the beta test phase at this writing, QuantumLink officials gave *Ahoy!'s* editors a hands-on demonstration of this remarkable game.

Habitat is a role-playing campaign in which each human participant controls an onscreen character known as an "avatar." As a device to heighten player-involvement, the gamer has some latitude in determining the appearance of his or her avatar. The user chooses a head and face from a databank which contains hundreds of possibilities and decides how the avatar should be dressed.

Each avatar owns a personal fiefdom called a "turf," which serves as a home base. The player can customize this turf in many different ways, including choosing the texture and color of every object within it. Stores in *Habitat* sell a selection of furniture to help do-it-yourself decorators. A well-heeled character can acquire such luxuries as a telephone which

The **Habitat** *player selects the head, face, and clothing of his/her avatar.*

pinpoints the locations of other avatars in the program's vast domain.

QuantumLink plans to set up a trust fund for each avatar so that no one has to spend his time in *Habitat* trying to earn a living. The avatar can draw the interest, but not the principal, to buy things. Treasure-hunters may increase their net worth by finding hidden bags of gold, and wheeler-

For customizing one's "turf," or home base, stores sell assorted furniture.

dealers may be able to work out financially advantageous trades with other avatars.

A citizen can stay home and putter, spend the day at the beach, go to city hall to collect information, visit other characters in their turfs, hunt for magic items and treasures, or just go exploring in search of experiences. Regions in *Habitat* include cities, suburbs, and even a fairyland with mushrooms as big as avatars. A projected add-on disk will make it possible to travel to alien planets and other dimensions.

There is no predetermined plot to restrict the scope of *Habitat*. Lucasfilm and QuantumLink have seeded

Most of the game's excitement results from interaction among the avatars.

this electronic universe with mini-adventures, but most of the excitement arises due to interaction among the avatars.

A major quest involves the search for a magic lamp. The genie inside will grant his liberator one wish. "Of course, it may not come true exactly as the player might wish," warns Janet Hunter, the Control Video executive in charge of the game.

The player moves an avatar with the joystick. Holding down the action button activates a four-choice menu that lets the avatar move around the screen, pick up or drop items, and perform specialized actions.

Several forms of communication are possible between avatars. Simply typing a comment puts it into an onscreen word-balloon which is visible by every other character in the region. By positioning the onscreen cursor directly over another character, a participant can send a private message to that particular avatar which others currently in the region cannot see.

The most controversial aspect of *Habitat* may be the inclusion of a deity known as the Oracle. The god of *Habitat* can wipe out an avatar's fortune, grant wishes, or curse the unworthy with the head of a donkey. Though QuantumLink's Hunter assures that such striking divine intervention will happen only rarely and after incredible provocation, the network expects some protests about the Oracle from the Petra Fellowship and other fundamentalist Christian groups. "We realize there is a potential for some problems," she admits.

The network will defend against criticism by pointing out that *Habitat*, for all its pseudo-realism, is just a game. Other role-playing systems, such as *Dungeons & Dragons*, have used deities, and CVC will assert *Habitat's* right to the same freedom of expression.

Habitat is the next generation of telecommunications gaming. Seldom has pioneering been so enjoyable.

Quantum Computer Services, Inc., 8620 Westwood Center Drive, Vienna, VA 22180 (phone: 703-448-8700 or 800-392-8200).

SUPER CYCLE

Epyx
Commodore 64
Disk; $39.95

Super Cycle is not just a motorcycle racing contest, it's a time machine. Designer Stephen Landrum whisks computerists back to those thrilling days of yesteryear, when arcade-style games ruled the roost and the joystick jockey was king.

Those who lament the recent scarcity of action-oriented software can cure those entertainment software blahs by strapping on a helmet and gripping the handlebars of this 750-cc speed machine. *Super Cycle* provides relentless action with a dollop of strategy to keep players on their toes.

Although the nonstop pace of *Super Cycle* may remind veteran gamers of the classic videogames, the graphics of this solitaire contest are strictly contemporary. The player's bike, always in the foreground of the display, is marvelously detailed and, therefore, easily distinguished from competing cycles. The scenery is a little sparse, but the overall visual effect is pleasing to the eye without distracting the gamer's attention from the road during competition.

A much-appreciated frill is the on-track official, who drops the flag to start a new race. The control panel at the bottom of the screen also signals the cyclist that it's time to ride, but the visual cue makes the situation seem much more dramatic. Prior to hitting the track, the user picks one of eight colors for the bike and chooses the style and hue of the cyclist's outfit. The same utility screen offers a choice of three different levels of difficulty. Starting with any but the easiest is a good way to see the excellent crash explosions.

The computerist employs a joystick to steer the cycle. By pushing the stick forward and simultaneously hitting the action button, the rider shifts to a higher gear. If the button is pressed while the stick is in the neutral position, the cycle downshifts one gear. Three lights arrayed vertically on the instrument panel represent the chopper's gears. A yellow light indicates the one which is currently in force.

Super Cycle: ***a race against time.***
READER SERVICE NO. 134

The most enjoyable aspect of *Super Cycle* is the way author Landrum has captured the feel of riding a competition bike. The tiniest movement of the control stick can send the powerful racer skidding from one edge of the track to the other, while the onscreen rider leans way over to the side in an effort to prevent a complete crackup.

The gearing isn't just for show, either. The computerist must carefully watch the speedometer and make the changes at just the right point. Otherwise, the cycle slows to a crawl. Proper shifting is especially important at the start of a race or just after the crash, since seconds lost then can make the difference between a successful race and a nice try.

The gamer races against time. The other cycles on the track are obstacles, not true rivals for the checkered flag. The program presents six courses to challenge the electronic athlete's prowess. The cyclist must complete a course before time (about 1.5 minutes) expires to advance to the next-hardest track. Every third course is a bonus run in which the rider can earn extra points and time by knocking down the flags on the road.

The first course has few twists and turns, but the routes of the subsequent tracks are much trickier. The harder ones add pylons, puddles, ice slicks, and even wooden barriers. These force the rider away from the safe center portion of the road and necessitate frequent, dangerous lane-switches.

Super Cycle provides more exercise for the fingers than the brain, so it may not be every computerist's delight. Those willing to give this engaging action program a chance, however, will discover an exciting change-of-pace from a steady diet of brain-teasing adventures and intricate simulations.

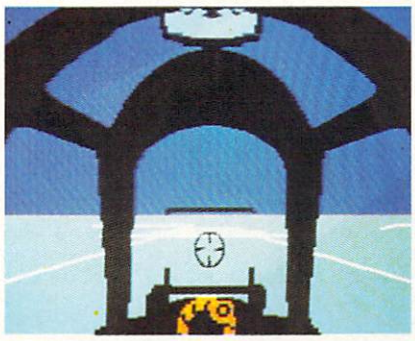
Epyx, 1043 Kiel Court, Sunnyvale, CA 90489 (phone: 408-745-0700).

—Arnie Katz

SPITFIRE 40

Avalon Hill
Commodore 64
Disk; $35.00

Amateur pilots not wanted! Only World War II aces need apply. *Spitfire 40* not only tests flying and fighting skills, but the gamer's patience as well. Battling enemy aircraft is enough of a challenge without also having to fight the program itself, which seems bent upon keeping the computerist from doing whatever he or she is trying to do.

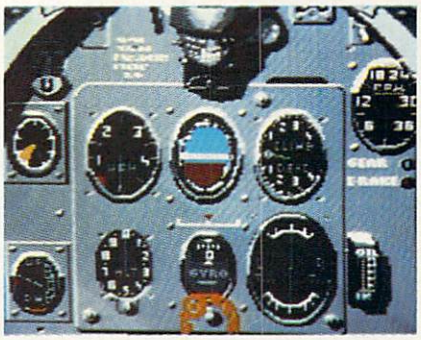


Spitfire 40: ***a wealth of detail.***
READER SERVICE NO. 135

Few computer games have successfully combined the complexity of a flight simulator with the excitement of air combat. This disk doesn't really turn the trick, either, but it is an honorable try.

The Spitfire first rolled off the assembly line and took to the air on May 14, 1938. It was one of the mainstays during the Battle of Britain. If the controls for the real Spitfire were as difficult as presented here, Germany's planned air annihilation of Britain might have worked.

After the user decides whether to try the simulator or the dogfight scenario, the main display screen appears with a view from the cockpit. The player can look at the panel or out the windscreen, but not both at the same time. The space bar toggles between views. In most instances, it is better to fly "blind" so that all the instruments are visible. The view outside is neither very impressive nor functional.



Spitfire 40's ***instrument panel is realistic but difficult to decipher.***

The most enjoyable aspect of this program is the incredible wealth of detail. It's an absorbing play-experience just to take off, turn right around, and land.

To launch the metal bird into the unfriendly skies, the computerist first engages the engine and raises the RPM to 1800. When the pilot disengages the brakes, the plane begins to roll and pick up speed. Then, the sound of the propwash fills the room. It is crucial to take off quickly at this point to avoid overheating, and to keep the plane from being damaged by the debris that's kicked up from the propwash.

The computer flier raises the RPMs to about 3000, waits for the air speed to reach 90, and then eases the joystick back. When the sound of the propwash fades, the plane is airborne and the user can tuck away the landing gear. Once the aircraft achieves a climb rate of 1000 to 2000 feet per minute, the stick can be returned to a neutral position.

All these moves would be even easier if the onscreen instrument panel were easier to decipher. A brief, yet informative pilot's notes and player's aid card makes the process of hunting up a gauge a lot easier. In an attempt at realism, the dials contain very few numbers. Therefore, the pilot must do a lot of guessing when the arrow lies between two marked points.

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Take the evaluation of Senior Editor David Martin, in *Private Pilot* magazine's August 1986 issue. Martin, a former Navy aviator who has flown almost everything with wings, reviewed five MicroProse programs, including the bestselling SOLO FLIGHT primary flight simulator. "I'd not have believed it possible . . ." he wrote, "Pilots of all sorts will be fascinated by these aviation games."

Mr. Martin isn't the only pilot who's spent many of his recent leisure hours with MicroProse simulations. Comparing his experience in training real flyers with the instrument layout found in SOLO FLIGHT, Cessna Flight Instructor Mark Rice told us "the instrument flying segments are very similar to the real thing – you're up in the clouds and using your readings to guide the aircraft."

Concorde pilot and former RAF jet flyer John Hutchinson reviewed Micro Prose' sport flight ACROJET for the British press. His conclusion: "this simulation is one that really does live up to its real-life counterpart . . . I find ACROJET completely absorbing and very exciting." High praise, from the man who flies the world's fastest airliner . . .

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Reader Service No. 152

is particularly challenging. No matter what the plane's altitude and speed, it is very tough to keep the nose level. This reviewer tried several joysticks to make sure it was not a mechanical problem, but the plane responded cantankerously to all control devices. Failure to watch the vertical speed indicator closely could have "grave" consequences.

The second problem involves navigation. The entire patrol area map appears at the touch of a key. Unfortunately, the map doesn't provide much information. The chart offers three scale-settings, but none is very illuminating.

In actual play, most pilots will want to watch the instruments while they adjust the flight path, and then return to the map to see the effect of such changes. It's not a good idea to make changes while the map is displayed, because the program doesn't continuously update the view. The chart doesn't scroll and lacks a compass rosette, so it's nearly impossible to get back to a specific area if the plane flies off the beaten path.

Another drawback becomes obvious when playing the battle portion. The indicators don't show information about the altitude of enemies relative to the computerist's ship.

One nice feature is the flight log. Difficulty is calculated for each individual user. Prior to play, the computerist formats a blank disk on which the program records that player's flight hours and success. The more flight time and the more kills in battle, the more difficult the game and the more skilled the enemy pilots become. Avalon Hill provides a certificate of merit for anyone who logs 60 hours in the air.

Spitfire 40 offers C-64 owners two games in a single package. Although neither the simulator nor the battle scenario is the best available, the program as a whole provides a pleasing variety of action for those who want their flying and their fighting on the same disk.

Avalon Hill Microcomputer Games, 4517 Harford Road, Baltimore, MD 21214 (phone: 301-254-5300).

—Rick Teverbaugh

JINGLEDISK $6.95
HEARTWARE $9.95
CARDWARE $9.95
PARTYWARE $14.95
WAREWITHALL $14.95
HOLIDAY PRINTERPAPER $9.95
Hi Tech Expressions
Commodore 64; Disk

The holiday season is almost here, bringing with it a universal need for attractive greeting cards. There is something special about a homemade card, and these programs can help even those who can't draw a Christmas tree design customized greetings packed with the holiday spirit.

ThoughtWare started this branch of computer design almost by accident. The company created *JingleDisk* as an electronic card to send to clients. Recipients praised it so enthusiastically that ThoughtWare launched a new division, Hi Tech Expressions, to create similar products for home use. The original program, now updated with new graphics, has become the flagship of an entire line of programs for making cards and associated party supplies.

It's not surprising that *JingleDisk* sparked so much excitement. It's stuffed full of seasonal paintings that make the Commodore burst with Christmas cheer. A six-minute illustrated story unfolds onscreen, detailing the adventures of a mouse, a cat, and a tin soldier. The trio's hijinks in front of the fireplace and decorated tree, accompanied by seasonal carols, would bring yuletide smiles to Scrooge.

JingleDisk contains a simple cardmaking option along with the animated holiday tale. It prepares an illustrated, folded card, with a clever graphic of the mouse hiding in a stocking hanging on the tree. The computerist can type in the names of sender and recipient.

HeartWare provides a three-minute animated friendship demo-message, music, and a card-printing function to prepare folded or full-page greetings. Users can also make a self-booting disk with a personalized greeting to send to friends and lovers.

The graphics available are sentimental in tone. Folded cards can be illustrated with nesting lovebirds, snails, fish, or a sun-drenched tree. Full-pagers include a picture of a forest pond with rainbow, a heart pierced by Cupid's arrow, and an underwater scene.

HI TECH EXPRESSIONS
HeartWare
Animated Friendship Greeting Disk And Love Note Maker
HI TECH EXPRESSIONS
PartyWare
Card & Party Design Kit With Data Base Of Friends & Events
HI TECH EXPRESSIONS
CardWare
Animated Birthday Greeting Disk And All Occasion Card Maker
HI TECH EXPRESSIONS
WareWithAll
Designer Paper, Envelopes, Stickers, Markers, Disk & Disk Labels To Jazz Up All Your Computer Printouts

Do-it-yourself cards, party goods, etc.
READER SERVICE NO. 149

CardWare makes everyone's birthday a more special occasion. A three-minute animated story details a shopping spree. The disk maker function creates animated self-booting greetings to send to computing friends. The cardmaking options have five child-pleasing graphics for folded cards, including teddy bear, rag doll, roses, birthday cake, and toy train. Full-page scenes include a pretty village, birthday candles with the recipient's name, and a baker holding a birthday cake.

PartyWare, a two-disk set, is a complete party design and greeting card kit. The built-in disk maker function creates personalized messag-

es framed by animated graphics. Printing functions create cards, note paper, place mats, banners, invitations, place cards, party hats, prize ribbons, and a party check list. The package even includes ideas for games and a database to store a guest list of up to 60 names. There's room to save nicknames, addresses, phone numbers, and the dates of two special events, such as anniversaries and birthdays.

To accompany these special programs, Hi Tech created *WareWithAll* and *Holiday Printerpaper.* These two packages have everything the computerist needs to make the greeting cards look more professional.

WareWithAll contains four kinds of designer printing paper: 20 sheets each of polka-dotted, star-spangled confetti-bordered, and heart-trimmed paper. Also included are greeting card envelopes, magic markers for addressing letters, a special gift disk, and some decorative stickers.

Holiday Printerpaper has three styles of paper that work with any print utility product. There are 50 sheets each of Christmas trees, snowflakes, and holly. *Holiday Printerpaper* also comes with a special graphics disk that contains more art for use with *PartyWare.*

The programs all operate smoothly, and their low price is no reflection on their solid quality. The resulting greetings, whether on disk or paper, are bound to make the holidays more cheerful.

Hi Tech Expressions, ThoughtWare, 2699 S. Bayshore Dr., Suite 1000A, Coconut Grove, FL 33133 (phone: 305-854-2318).

—Joyce Worley

PSI 5 TRADING CO.

Accolade Entertainment Software
Commodore 64
Disk; $29.95

Travel lanes crisscross space in the 35th century. Ships transporting cargo and passengers fill the skyways of the galaxy. Brisk commerce between the intelligent races of the known planets keeps freighters zipping through the shipping lanes. A captain with a good crew has a chance to amass a fortune shepherding goods from one port of call to another.

Alas, there's more in space than friendly transports and passenger ferries. Along the Parvin Frontier, a mining quadrant populated by settlers, entrepreneurs, and social misfits, cargo pirates prey on legitimate travelers. These space thieves will clear a hold of its wares before the captain can say, "Who goes there?"

Wise leadership might crew the ship, choose a mission, and win through to the destination with cargo and freighter intact. Odds are that something will go amiss. Equipment failure, delays, and personnel problems are bad enough, but just when the captain's hands are full coping with these workaday emergencies, the pirates add the final straw to his backbreaking load. It's not easy to get rich, even in the future!

Psi 5 Trading Co. casts the computerist as commander of a cargo freighter, trying to earn an honest buck by delivering goods to Parvin planets. Designer Mike Lorenzo, best known for his videogame hits *(Oink, Circus, Golf),* has created a complex spaceship and an exciting roster of characters to act as crew. The resulting simulation calls for good judgment and steady nerves, but even these attributes may not be enough to overcome the problems that confront the *Psi 5* player.

The captain first chooses the course from a menu of several possible assignments. The roster lists the distance, cargo, and projected payment for completing the mission. Since the rewards are proportionate to the risks, it's best for novice pilots to start with a simple destination until management of the ship and its personnel becomes automatic. The experienced space skipper can then tackle one of the higher-paying long hauls.

The specialists of the crew run five key positions which go far to determine the success or failure of the enterprise. Choosing the right human, alien, or vaccdroid worker for each spot is an important part of the game.

There are six candidates for each department position, shown on the screen as a rogue's gallery of photographs. The candidates' resumes list name, nickname, age, marital status, qualifications, educational background, experience, strengths, and weaknesses.

The player must evaluate these spacedogs' histories and hire officers for the Weapons, Scanning, Navigation, Engineering, and Repair Departments. It isn't always easy to assemble a crew that works well together. As in the real world, expert skills in one area often go with deficiencies in others. Sometimes a strong candidate has grave personality flaws which make it difficult for him or her to fit into shipboard life.

The captain's communications console, which fills the display screen, provides all the data needed to run the mission and maintain contact with the ship's personnel. Graphic artist Mimi Doggett did an exemplary job producing this attractive and easy-to-use screen.

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Reader Service No. 162

The upper left half of the screen looks out on space, and the scene changes from forward to aft to monitor traffic coming and going. The communications screen is on the right half of the display. This displays a picture of the department head to whom the captain is talking.

A band of indicators across the middle of the screen monitors the ship's functions, including shield and battery indicators, temperature, weapons and supply information, and speed and compass readouts. Unfortunately this band of dials and gauges is so densely packed that they are difficult to interpret. The savvy computerist will memorize what each symbol means.

Below this tightly packed data strip, a second band lists the departments. Selecting one initiates communication with that section's manager.

The information window in the lower half of the screen reveals data and a steady battery of incoming messages from the onboard specialists. Shifting among the sectors, the captain examines the status of activities in each department via his telecommunications screen, and assigns work.

It takes constant monitoring of all the ship's departments to properly prioritize work assignments and insure top efficiency. The Scanning Department keeps track of other space vehicles and identifies their positions, class of people, and whether they are friends or foes. The Weapons Department displays the type of munitions available and executes attack commands. The Navigation Department shows the possible courses, estimated time of arrival at the destination, risk factors, and speed. Engineering allocates power to the parts of the ship where it's most urgently needed. Finally, the Repair Department, with its crew of robodroid assistants, fixes all damage sustained.

The graphics are the best part of the program. The viewport creates a satisfactory illusion of interplanetary travel, and the communications console is sparked by clever bits of animation. The crew members are depicted as a satisfying mixture of human, alien, and robotic lifeforms. The keyboard or joystick controls all gaming options, and it is easy to move between departments with the communications device.

It is not easy to master the ship's controls, nor to determine the perfect allocation of power to keep the freighter alive, defended from enemies, and on time. Unfortunately, most gamers will fail again and again before they are able to complete even one expedition. The training mission guide included with the documentation lacks the detail necessary to adequately teach new pilots. Many players will give up before they get the hang of it.

Once the gamer does gain control of the ship, *Psi 5 Trading Co.* is not quite as exciting to play as its appearance might suggest. Beneath the fancy visuals, *Psi 5* is a complex simulation which requires the user to juggle a lot of factors during the course of a mission. Gamers who don't favor this sort of mental acrobatics might prefer a more action-oriented program. Those who do like complex strategy contests, however, will enjoy many problem-filled missions as they explore the frontiers of space.

Psi 5: ***mental acrobatics required.***
READER SERVICE NO. 136

Sys. Weap. Scan. Nav. Eng. Rep. Manual
WEAPONS - FIRING ORDERS LIST
ID Shots Weapon Target Pri Status
C 3 Missiles at B 3 out-range
F 7 Blasters at E 3 in-range
A 2 Cannons at A 4 broken
E 5 Thermos at C 6 no power
G 9 Blasters at G 8 in-range
B 3 Cannons at D 9 broken

Information window displays data, incoming messages from specialists.

Accolade, 20863 Stevens Creek Blvd., B-5/E, Cupertino, CA 95014 (phone: 408-446-5757).

—Joyce Worley

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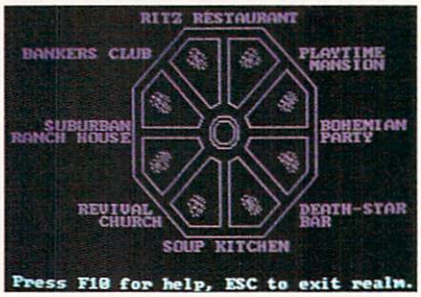

Mind Mirror: *substance beneath hype.*
READER SERVICE NO. 138

MIND MIRROR

Electronic Arts
Commodore 64
Two disks; $32.95

Timothy Leary's *Mind Mirror* represents the ultimate computer expression of pop psychology. The man who led a generation of pharmaceutical experimenters in the 1960s has turned to software for mental expression in the 1980s.

The front cover shows a hand bearing a crystal ball against a post-rainstorm sky. Within the crystal stands Dr. Tim. His face is distorted slightly by the globe's fish-eye effect, but remains instantly recognizable. He is depicted in Yuppie Heaven: a modernistic habitat of white walls, clean lines, and "raw-look" wood. A caveat tacked to the shrinkwrap promises that this software "can be hazardous to your stereotypes." The copy on the back cover actually invites consumers to "Tune in, turn on, boot up."

If all this strikes software cynics as a terminal case of computer hubris, the impression is erroneous. As is so often the case with Dr. Leary, there is a surprising amount of substance beneath the outrageous hype.

Mind Mirror is a fine example of a genre now attaining popularity among computerists: the life simulation. Like Dr. Peter Favaro's *Alter Ego* (Activision), this program explores the entertainment possibilities of vicariously experiencing life through another's eyes.

Mind Mirror offers three types of activities. First, the user learns to create the "mind maps" which serve as the basis for the program. The second segment of *Mind Mirror* applies the concept to "real" life. The computerist creates mind maps of movie stars, athletes, politicians, and the like and then runs these simulacra through a series of exercises on subjects like "Religious Tolerance." Finally, the user actually steps inside the construct for a walk through an actual life experience. To sample the full ramifications, create a mind map of Ronald Reagan, and then check out a punk rock club. Or how about going on a job interview as Boy George?

Events are described in prose. There's some visual stimulation, however, in the form of beautiful neo-psychedelic transition sequences. They're guaranteed to remind older Commodore owners of a 1960s rock concert light show.

The package includes a booklet that is almost worth the price of admission. Dr. Tim convincingly demonstrates that there's still lots of spring in his synapses with a brief history of human thought that says more in a couple of pages than many philosophers speak in volumes. *Mind Mirror* reflects Dr. Leary's view that mankind has passed beyond the "mechanical thought" patterns of the post-Gutenberg era, into the age of "electronic thought." "Just as the industrial age replaced the one-tool-at-a-time hand craftsmanship with toolmaking machines, now the mechanical thinker—the PhD "man of letters" (who laboriously wrestles heavy Macro thoughts in and out of wood-pulp paper)—is being replaced by the electronically literate person who has access to a thoughtmaking program," explains the Doctor, who elsewhere refers to his program as a "thought processor, headware for the computer generation."

Mind Mirror is a piece of software that does something genuinely rare: It enlightens while it entertains.

Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404 (Phone: 415-571-7171). *—Bill Kunkel*

FRANKIE GOES TO HOLLYWOOD

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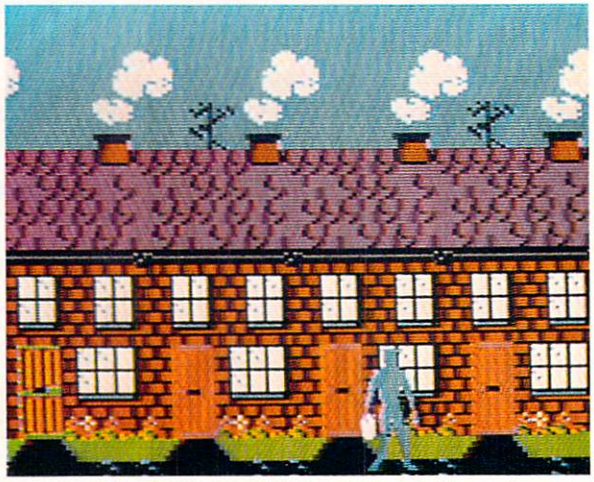
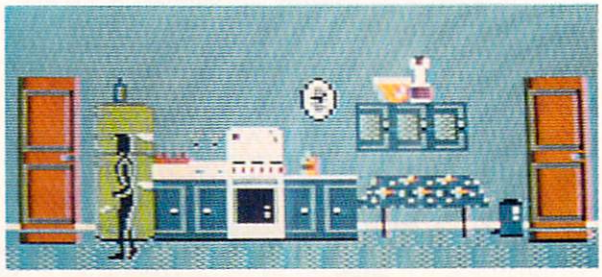
"Relax," urged the British pop group, Frankie Goes To Hollywood, in their biggest hit song. Unfortunately, no one told the design team that too much relaxation might be injurious to the finished program. After bopping to a peppy computerized version of the title song, the computerist can play this contest for hours without experiencing even the slightest resistance from the characters or

Frankie Goes to Hollywood *requires the player to advance from Mundanesville to the Pleasure Dome by collecting four pills which, when consumed, either double pleasure or halve pain.*
READER SERVICE NO. 139





The rooms the player passes through contain clues which must be interfaced with devices found elsewhere.

situations.

Frankie Goes To Hollywood is yet another in an endless string of British-produced action games which shamelessly ape Epyx's classic *Impossible Mission*. Once again, Anglo designers have concocted a scenario in which a player-surrogate moves through a seemingly infinite series of corridors and rooms.

As usual, the rooms contain clues—sometimes out in the open, sometimes hidden—which the player must collect. Some of these objects must be interfaced with other devices located elsewhere within the game. For instance, a videocassette can only be played on a VCR, and a computer disk must be booted on a compatible micro system.

Frankie Goes To Hollywood pulls out all the stops in terms of game gimmicks. It adheres faithfully to the philosophy that "more is better." Many British computerists believe that the more rooms, puzzles, and required tasks a game contains, the better value it is.

In a sense, this is true. Unfortunately, it doesn't say much about the quality of the games which this quantity-oriented approach generally produces. Those who want a really sprawling action-adventure, even at the cost of inventiveness and originality, should enjoy this.

A fair example of the "kitchen sink" approach used to design *Frankie Goes To Hollywood* is the murder. Near the start of the game, the player stumbles upon a dead body. Thereafter, clues appear as the character continues to move through the corridors. These clues contain information about the suspects and the murderer.

Clues concerning possible suspects might inform the player that "Miss Blofu is a vegetarian," or that "Capt. Klack is illiterate." Elsewhere, the game provides information about the killer like "The murderer left behind a cookbook: '50 Ways To Prepare Penguin.' " The player must correlate the various pieces of information to pinpoint the criminal.

Despite the nagging sensation that most of this program's "original" elements are cleverly disguised borrowing from *Impossible Mission*, Frankie does demonstrate some inventiveness. The player must try to make the leap from "Mundanesville," an appropriately ordinary suburb, to the arcadelike Pleasure Dome. The computerist can't go to the Dome without first becoming a complete person by collecting four types of pills which, when consumed, either double pleasure to halve pain. These pharmaceuticals, combined with actual experiences, increase the player's status as a "real person." Frankie Goes To Hollywood (the group), which acts collectively as the game's deity, periodically grants "pleasure units" and announces the player's new status (i.e.: "The player is now 20% a real person.")

The idea that pills, represented by icons which resemble a ribbon, a hypodermic needle, a heart, and a cross, make people more "real" is fairly remarkable. *Frankie Goes To Hollywood* is supposed to be controversial, but its seeming advocacy of wide-spectrum drug-taking may be going a little far. Parents may well want to use discretion or, at the least, discuss the theme of the program with young computerists.

Another problem is that it takes an eternity to reach the Pleasure Dome. Adding salt to the wound is the fact that *Frankie* can't be saved, which means the player must retrace the same tortuous route each session.

A much worse drawback is that the gamer doesn't face a single serious challenge during the entire tour of Mundanesville. The player simply moves from room to room, searches for objects, and takes them. The only decision for the computerist is which item to discard when the character can't carry any more. There's no time limit or hostile force which impels the player to keep moving and work fast, yet this scavenger hunt is too simple to require the gamer to ponder each move for more than a few seconds. Where are those killer robots from *Impossible Mission* now that we need them so badly?

The graphics delineate every on-screen object in marvelous detail. The icons, which are virtually ignored in the documentation, are well-drawn, but the symbolism is a little murky. The cross obviously represents religion, but what does the hypo symbolize? If the needle is supposed to stand for health or medicine, some less flagrant image might have been a better choice.

Frankie Goes To Hollywood is a game with a lot of promise, all of it sabotaged by the lack of any genuine conflict in the long introductory sequence. There's plenty to do and see, but after a few hours of seeing and doing it, the thrill is gone.

Firebird Licensees, P.O. Box 49, Ramsey, NJ 07446 (phone: 201-934-7373). *—Bill Kunkel*

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- **Macbeth**
- **The Arc of Yesod/The Nodes of Yesod**
- **Battlefront**

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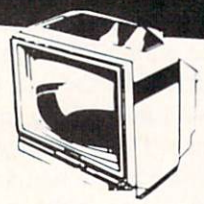

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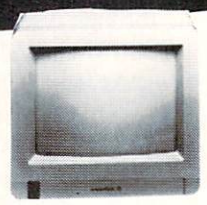

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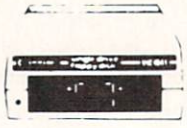

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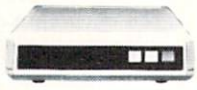

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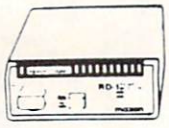

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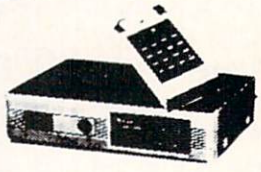

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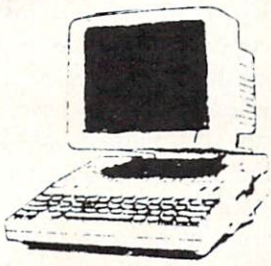

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SYNTAX PATROL

Instant Error Detection for the C-64

By Buck Childress

Snap! Crackle! Pop! No, that's not your cereal bowl talking to you. It's *Syntax Patrol* zapping the bugs out of your programs. *Syntax Patrol* knocks those bugs out before they get in. It keeps an eye on the syntax of each line as you enter it and stops those errors cold. No more marathon debugging sessions. No more unusual verbiage emanating from the mouth. Will computing ever be the same?

Use *Flankspeed* (page 121) to enter *Syntax Patrol*. After saving the program to disk, reset the computer and LOAD"SYNTAX PATROL",8,1. When it's through loading, type NEW and press RETURN. Then type SYS 51000 and press RETURN. That's all there is to it. *Syntax Patrol* is on patrol. Now whenever you enter a program line and press RETURN, *Syntax Patrol* checks for errors and lets you know immediately if any exist. The line won't be added to your program until it's error free. It's as simple as that.

Syntax Patrol is really handy for digging out those no-nos in an existing program, too. If one of your programs has the Syntax Blues, just load it up and list it, place the cursor on the first line, and start pressing RETURN. Zip, bam, pow...you'll find those typos, bleeps, and blunders in no time flat.

As an added feature, *Syntax Patrol* is fully compatible with the *Failsafe* automatic program saver (May '86 *Ahoy!*). You can keep the bugs out as you go and have those spiffy program lines saved automatically. To use them together, just load and run *Failsafe*. Now load and activate *Syntax Patrol*. By the way, whenever you activate *Syntax Patrol*, you're asked if you want to use *Failsafe*, too. Press the N (no) key if you don't or the Y (yes) key if you do.

If you choose yes, *Syntax Patrol* first checks to see if *Failsafe* has been loaded, and lets you know. Then it makes the necessary adjustments in *Failsafe* so they'll work together automatically. Now you can just program to your heart's content. After 15 minutes, *Failsafe* waits for you to press RETURN on an error-free line. Because a save won't take place on a messy line, your gem stays nice, neat, and pest free.

To deactivate the utilities, type SYS 51000 and press RETURN. SYS 51000 turns *Syntax Patrol* on and off. And, because *Syntax Patrol* controls *Failsafe*, it also deactivates *Failsafe*. *Syntax Patrol* returns *Failsafe* to its original state so, if you want, you can use it alone.

Here are a few things to remember. *Syntax Patrol* checks the syntax of your program. It'll find the typos (e.g., PKOE instead of POKE), improper punctuation, missing parentheses...just about everything you're likely to come across as a BASIC programmer. It's up to you, though, to make sure that your program is sound. For example, if you have a NEXT command in your program, you must have a FOR command somewhere in there, too. *Syntax Patrol* accepts NEXT as a proper command, but a missing FOR won't show until the program is run, and vice versa. The same holds true for other types of commands such as FNA(X), PRINTB$(20), READA, etc. They're all syntactically correct. But, if somewhere in your program you haven't defined the function or dimensioned the array, or you don't have enough data, you'll get an error when your program is run. Unfortunately, there's no way that *Syntax Patrol* can anticipate what you will have in your program. If you watch this part, *Syntax Patrol* will do the rest.

Syntax Patrol is a machine language program that uses an area of RAM totally separate from BASIC. Although, in most cases, you can load, save, and run programs on a non-interference basis, it's a good idea to deactivate *Syntax Patrol* first, just to be on the safe side. Remember, SYS 51000 alternately switches it on and off.

Put *Syntax Patrol* on the job. Your programs will be so clean they'll squeak.

SEE PROGRAM LISTING ON PAGE 128

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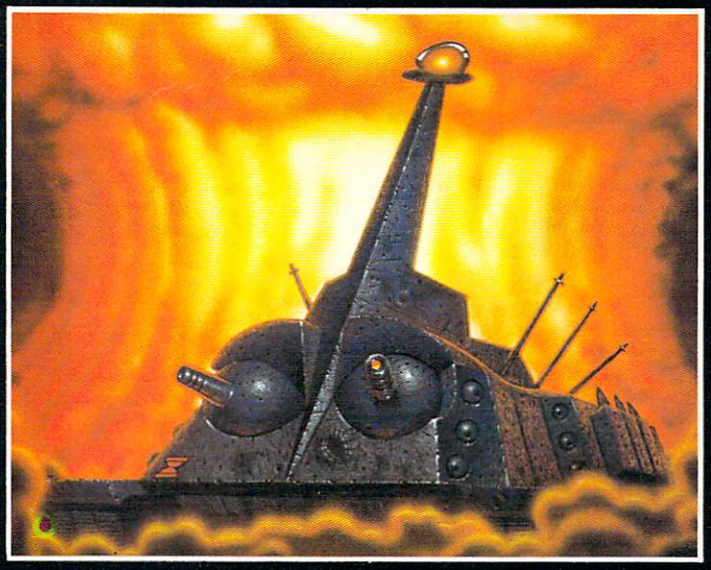

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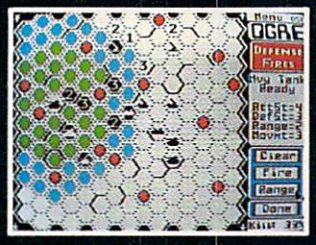

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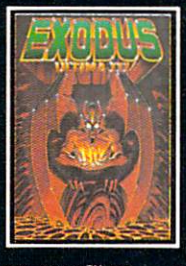

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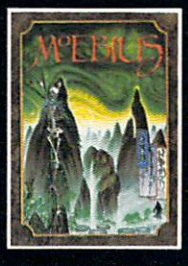

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DISCS OF DAEDALUS

For the C-64

By George Decker

Years of experimentation paid off for the research team made up of earth's greatest biophysicists. After repeated failures, they perfected a bio-interfaceable anti-gravity compound—a synthetic metal which, when brought into contact with living cells such as in a human hand, would float like a helium balloon.

But the team's triumph was short-lived. For warmongering Jershans, who monitored the broadcast of the scientists' press conference, kidnapped the entire team and enslaved them to work in laboratories on various planets throughout the Jershan space system, planning to exploit their genius for the purpose of weapon design. An early warning system protecting all the planets prevents any spacecraft from landing and staging a rescue attempt.

The Jershans did not count on earth's elite rescue corps using the scientists' own invention to save them. For by dropping pieces of the anti-gravity substance to the planet's surface from a safe distance above, the scientists could be enabled to float to the rescue ships—and freedom. The fragments to be used, cast by the scientists in the shape of weightlifting plates, have been codenamed the Discs of Daedalus, after the character in Greek myth who escaped imprisonment on wings of his own invention.

HOW TO PLAY

There are five different screens to go through. Upon completing the last screen, you start over at the first.

Screens one, three, and five get larger each time you go through them. That is, starting with the second time through these screens, you will repeat them. The third time you will go through them three times, the fourth time four, etc.

Screen four is timed for how long you stay there. Each time through this screen will increase the amount of time you will stay the following time.

All screens get a little faster each time through, and completing the last screen will award you an extra ship, up to a maximum of three.

The number of ships in reserve is displayed in the upper left of the screen. The number of scientists rescued is displayed in the upper right.

Screen One, landing sequence: Your ship will appear at the top of the screen and can be moved right or left for positioning. Below your ship are mines you want to avoid. When you push your joystick button your ship will descend. You have no control over the descent, but can move right or left to avoid the mines.

Hitting a mine results in the loss of one ship.

Screen Two, rescue sequence: An enemy ship will be on the right side of the screen and move up and down firing missiles at you. At the bottom of the screen is the scientist who will be moving back and forth. Your ship will stay in the upper half of the screen and can be moved up, down, right, or left. To rescue the scientist, push your joystick button. This will release a disc that he will need to catch to fly up to your ship. You have an unlimited amount of discs, so if you miss you can try again.

To complete this sequence, catch the scientist by touching him with your ship when he is flying up in the air.

You are responsible for all your equipment and the scientist's life. This means that if your ship, disc, or the scientist is hit by a missile, you lose a ship. You will also lose a ship if the scientist reaches the top of the screen before you catch him.

Screen Three, takeoff sequence: Remember when you descended through the mines? Now you have to go back up through them. This is just like screen one, except you are going up instead of down.

Screen Four, missiles in the space storm sequence: Missiles will fill the air and move right, toward your ship. Your ship will be on the right hand side of the screen and can move up or down to avoid the missiles. Because of the space storm, you will not always be able to see the missiles. Watch for the brief periods of light that will let you see them so you can avoid being hit. Also listen for the sounds they make, so you can judge how far they have advanced when they can't be seen.

Being hit by a missile results in the loss of one ship.

Screen Five, force field sequence: Your ship will be positioned on the right of the screen. The force field will be on the left, running top to bottom. In the force field is an opening that will constantly move up.

When you are ready to start, push the joystick button. Your ship will move to the left and won't stop until you reach the other end of the screen or hit the force field. You can control your ship by moving it up or down.

To complete this sequence, guide your ship through the force field opening. Hitting the force field results in the loss of one ship.

LOADING AND RUNNING

Type in LOAD "RESCUE",8,1 and hit RETURN. When the program is loaded type in SYS 49152 and hit RETURN to start. □

SEE PROGRAM LISTING ON PAGE 133

DETONATION

For the C-64

By Bob Blackmer

Evil Koloccan terrorists have planted numerous bombs throughout the sacred temple of Remkcalb. They have also impregnated the temple walls with a substance connected to the detonating device, and placed vaporous swirls of energy protecting each room in the temple in which a bomb is placed. You have been selected to try to save the temple from destruction because of your knowledge of explosive devices and your athletic prowess. Time is of the essence, as the temple will be destroyed in less than eight minutes after the fuse is lit.

Your mission is to enter each room of the temple, retrieve the bombs, and take them to your containment room, where you will defuse them. This will clear one level of the temple. Do this 11 times and you will have saved the temple.

Detonation is an explosive, colorful arcade game for the C-64. When the title screen appears you will see the temple rooms at the top, left, and right portions of the screen, and the three vaporous swirls which will be your nemeses. The bottom of the screen is your base, the containment room where you will defuse the bombs and go to enter the next level. The fuse that will serve to make you nervous runs around the screen border. In the background you will hear the haunting rhythm which will accompany you throughout the game.

You begin the game by pressing the fire button of a joystick plugged in Port 2. You will see the fuse light and begin to burn. You are at your base at the bottom of the screen. Any contact with the walls of the rooms, the walls of your base, or the vaporous swirls will result in the burning of the fuse at a frenetic pace. You must enter each room as you avoid the swirls and retrieve the bomb. After obtaining all three bombs you must go to your containment room, where they will be defused. This will complete one level, signified by a bomb appearing at the bottom of the screen and the increased speed of the swirls. The pulsating rhythm will also speed up, providing a musical pace for your mission. Upon completion of the tenth level, the pace of the swirls and music will be sheer madness, and I wish you luck. If you are successful at this level, your score will be determined by the amount of fuse left. Needless to say, if the fuse burns out during your mission there will be a monumental explosion signifying your failure.

Your character on the screen possesses great speed and mobility, enabling you to complete your task if you are diligent in avoiding contact with the swirls. If you like to shoot for a high score, my best is 87,000. If anyone (I mean you) can top this, write me care of *Ahoy!*

Detonation is written in machine language and must be entered using *Flankspeed* (see page 121). After typing *Detonation* in and saving it, reset the computer and LOAD "DETONATION",8,1. Type SYS 49152 to start. □

SEE PROGRAM LISTING ON PAGE 143

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BUFFER-IN, BUFFER-OUT:
Speeding Up Your Computer Throughput

Text and Photos by Morton Kevelson

Speed! That's what computers are all about! The entire life of a computer centers around its ability to perform hundreds of thousands of rudimentary mathematical calculations per second. Even the most modest of these machines have hearts which beat a million times per second. Each beat represents another computerish thought brought to fruition.

The full speed of the computer is unleashed only when it is communing with itself. When interaction with the outside world is required, it more often than not winds up twiddling its thumbs. We humans are probably the worst offenders in this regard. We require our machines to patiently await each and every one of our keystrokes. The failure to heed just one results in the immediate censure of the hapless machine.

When it comes to sending information to the outside world, the tables are turned. In most cases we want all the speed the computer can give us. For some things, the display screen for example, the computer is more than adequate for the task. Very few humans can read text as fast as the machine can put it on the screen. However, we are dissatisfied with the time the majority of output operations take. The 1541 disk drive has received much criticism in this regard. But even more aggravating, perhaps, are printers. Even the fastest dot matrix printers barely put text on paper at a rate which makes for comfortable reading. Most of us have experienced the everlasting tedium of printing a large document or a lengthy program listing.

Fortunately, there is a purely electronic solution. Low cost computer memory chips have made it possible to assemble large blocks of computer memory at very little expense. When properly combined with a microprocessor, a suitable control program in ROM, and several support chips, a block of RAM can be set to behave like a very fast printer connected to the computer's output port. We now present two such devices which perform the desired task in fundamentally different fashions.

SERIAL BOX

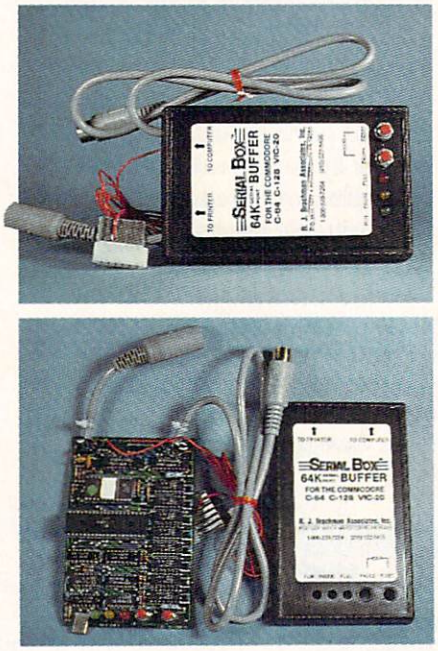
R.J. Brachman Associates, Inc.
Commodore 64
Price: $79.95

To our knowledge *Serial Box* is unique in the Commodore world. It is the only 64 kilobyte buffer which interfaces directly with the proprietary Commodore serial port. As such it may be used with any of the Commodore printers (1515, 1525, 1526, MPS series) which were designed for the VIC 20, C-64, and C-128.

However, slapping a big buffer on the Commodore serial port is not as simple as it sounds. Some thought has to be given to just how this device will be controlled. After all, Commodore serial port peripherals are expected to be "intelligent." That is, they all have microprocessing power of their own, with the ability to process instructions and take appropriate action.

R. J. Brachman has given the proper thought to the design of their product. *Serial Box* appears to the serial port as a hardware device number 6 acting as a buffer for hardware device number 4. This means that commands to *Serial Box* are issued to device number 6. In turn, *Serial Box* will automatically pass on all data and commands intended for device number 4. This arrangement will work fine with the majority of installations. However, for those rare cases, both the *Serial Box* device number and its associated buffered device number may be changed under software control to any value from 4 to 7. Of course you must make sure that *Serial Box* and its buffered device do not have the same number, or terminal confusion will result. The accompanying user manual makes these facts, among many others, perfectly clear.

Note that *Serial Box* does not take the place of a printer interface. If you are using a non-Commodore printer you will still require the services of a serial port printer interface in conjunction with *Serial Box*. Of course,



Serial Box *sports 6502 microprocessor, 4K of operating system in ROM, and 64K of dynamic RAM. Note that an unusual software refresh of the dynamic RAM is made use of.*
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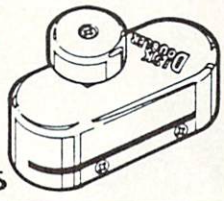

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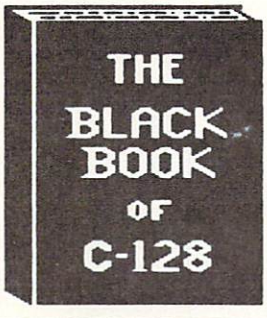

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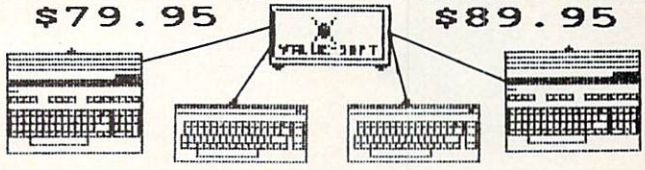

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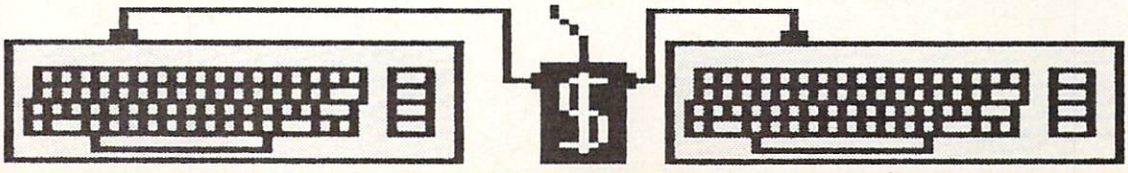

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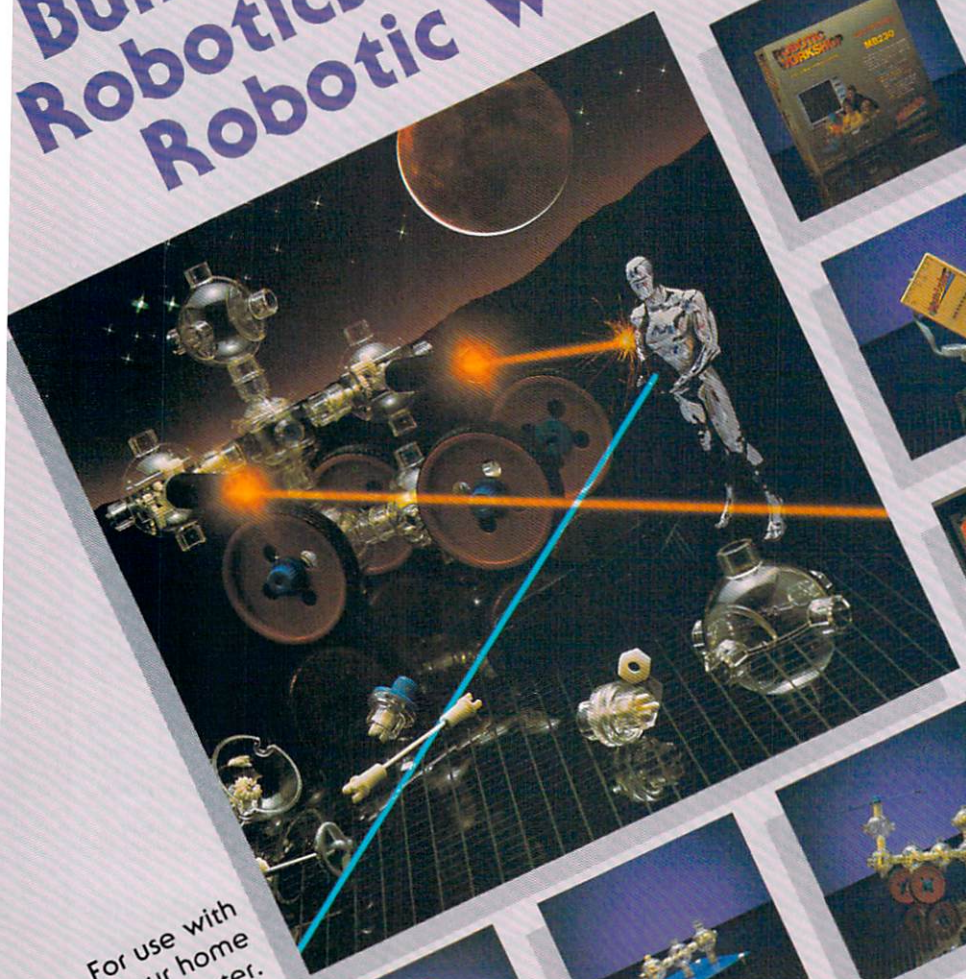

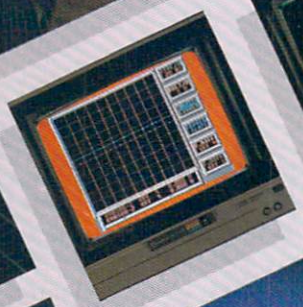

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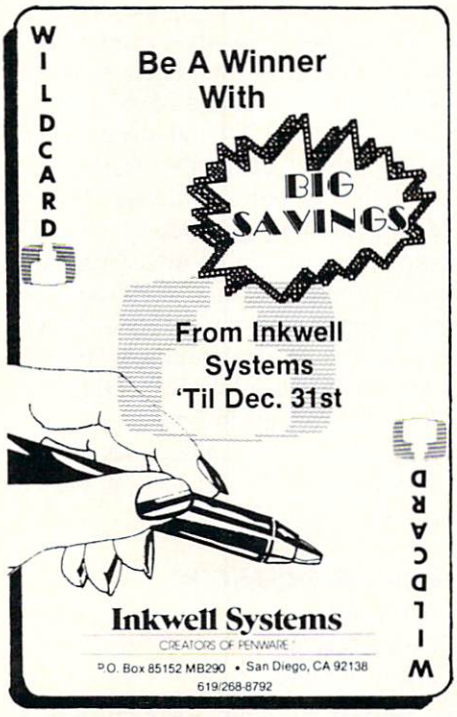

the connection order requires that *Serial Box* goes between the computer and the printer interface.

The *Serial Box* hardware is contained in an unimposing 3-1/2 by 5-3/5" black box not much different in external appearance from most printer interfaces. Communication with *Serial Box* is via a pair of unshielded cables which are terminated in male and female six-pin DIN connectors compatible with the Commodore serial bus. Thus *Serial Box* becomes another link in the serial port daisy chain. Of course it should be the last link right ahead of the printer or its associated interface.

Power for *Serial Box* is supplied over a single red wire terminated in a cassette port connector. This may be fine for use with the VIC 20 or the C-64, but it will cause problems for SX-64 and Plus/4 users. (See next month's *Ahoy!* for information on building a 5v power supply.)

The front panel of the serial box also sports a trio of colored light emitting diodes (LEDs) in red, yellow, and green, along with a pair of red push-buttons. The green light signifies that all is well with *Serial Box*. The yellow light indicates that pause mode is in effect. The red light signals that the buffer is full, sort of a case of *Serial Box* indigestion. One of the push-buttons serves to place *Serial Box* into pause mode while the other serves to reset the built-in line counter. Simultaneously pressing both buttons will clear all data stored in the buffer.

The LEDs will also light in various combinations to indicate the possible operating conditions. For example, all three lights lit at once indicates that the buffer has filled while the printer is off-line. This may be considered as a case of terminal indigestion with no place to go.

Operating *Serial Box* is simplicity itself. Just plug it in, turn everything on, and away you go. There are several other features of which you will most likely wish to avail yourself. The pause button takes primary consideration. This stops output to the printer while still accepting data from the computer. The primary advantage of this mode is a slight increase in speed. During normal operation the buffer sends one character to the printer for every eight received from the computer. When in pause mode *Serial Box* turns its full attention to the computer, resulting in a slight increase in speed. Note that pausing *Serial Box* does not suspend the printing of any data which may already be in the printer or interface buffers.

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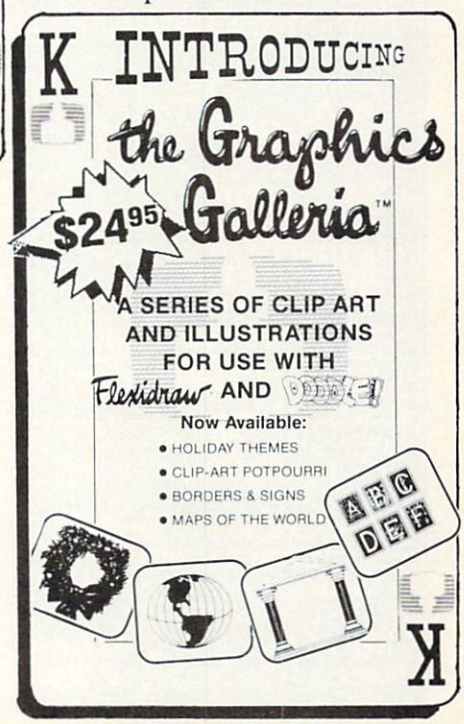
The actual operating speed of *Serial Box* is dependent to a great extent on the capabilities of the software running on the computer. In general, word processors will be able to make the most of *Serial Box*, as these programs can generally transmit text as fast as the printer can take. Graphic dumps will give variable results, as they are usually calculation-intensive. The actual benefit you will perceive will of course depend on the speed of your printer. The slower your printer, the more you will gain.

R. J. Brachman claims a top speed for *Serial Box* of 677 characters per second (cps). We clocked the device at about 450 cps while dumping an 18K text file from *Easy Script* with *Serial Box* in pause mode. The speed of normal operation will also depend to some extent on the printer or printer interface used in conjunction with *Serial Box*. Throughput while driving a Cardco Super-G and a Gemini 10X was about 250 cps. A large buffer in the associated interface does not guarantee additional speed. Running with a Xetec *Super Graphix*, with an 8K built-in buffer, resulted in only a 6% speed increase. However, an MW-350 with a 10K buffer generated nearly a 40% speed improvement over the Cardco combination. Note that the printer interface will have no effect on speed when *Serial Box* is



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in pause mode. In this case *Serial Box* always runs at its maximum possible speed.

Do not confuse the *Serial Box* throughput speed we have just discussed with the operating speed of the printer interface while emulating a Commodore 1525 printer. These speeds are entirely independent of each other. The former refers to the rate at which data is taken from the computer. The latter indicates the rate at which the interface drives the printer graphics mode. Refer to the various printer interface reports which have appeared in *Ahoy!* for additional details.

Most Commodore printers and printer interfaces will work just fine with *Serial Box*. However, the manual does list several products which use "non-standard" serial port timing. Interestingly enough, one of these products is the Commodore DPS-1101 printer. The problem lies in the incomplete specification of the serial bus timing which has been published by Commodore. To avoid these problems, *Serial Box* has a built-in mode that slows it down slightly for use with particular peripherals. However, this operating mode has no effect on *Serial Box's* speed when it is in pause mode.

Serial Box will not solve all printer speed problems. In some cases the printing speed is totally dependent on the driving software. The best example that comes to mind is the highly popular *Print Shop* from Broderbund. This program spends an inordinate amount of time "thinking" about what it's going to print. As a result there is virtually no benefit to be obtained from *Serial Box* for this application.

To make life easier for the Commodore user, *Serial Box* recognizes several software operating commands. Among these is the ability to keep count of the number of lines printed and to skip the paper perforatioins at appropriate intervals. The remainder of the commands allow you to duplicate the *Serial Box* hardware functions under software control, change its associated device numbers, and adjust the line counter and perforation skip parameters.

Serial Box is an ideal supplement to the standard Commodore printers (1515, 1525, 1526, and MPS series). These printers are relatively slow with little or no built-in buffering. Actually, to our knowledge, *Serial Box* is the only product which will offer some relief with these Commodore printers. Of course, *Serial Box* will benefit all letter quality or NLQ dot matrix printer operations. Price-wise, at $1.25 per kilobyte, *Serial Box* is certainly hard to beat.

R.J. Brachman Associates, Inc., P.O. Box 1077, Havertown, PA 19083 (phone: 215-622-5495).

PRINTER ENHANCER

Xetec, Inc.
Commodore 64
Price: $249.95

Strictly speaking, the *Printer Enhancer* is not a Commodore-specific peripheral. However, Xetec has been a supplier of Commodore printer interfaces for some time now. In fact, if you have been using their *Super Graphix* printer interface, you will recognize the fonts which the *Printer Enhancer* generates.

The *Printer Enhancer* is designed to work directly with the Centronics type of parallel printer hookup. It is equipped with a single Centronics input port and a pair of shielded output cables, terminated with Centronics connectors which are suitable for most popular printers.

In addition to 64K of built-in buffering, the *Printer Enhancer* also has eight near-letter quality (NLQ) built-in fonts when used with a compatible dot matrix printer. The font samples presented here were produced with the *Printer Enhancer* and a Star Micronics Gemini 10X printer.

Typewriter Font
Italic Font
Script Font
News Font
Manhattan Font
Shadow Font
Block Font
Tech Font

Setup of the *Printer Enhancer* is simple. Just plug the "A" cable from

the *Enhancer* into your Centronics printer. The Centronics cable from your existing interface connects directly to the *Enhancer.* If you are using a second Centronics printer, just hook it up to the *Enhancer's* "B" cable. Power for the *Enhancer* is obtained from a self-contained "battery eliminator" style plug-in wall transformer. Thus it will place no additional burden on your Commodore's power supply.

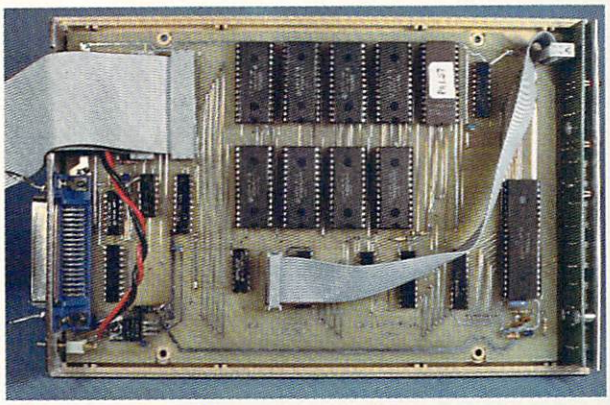
Note that a second Commodore style printer interface, or any type of printer switch, is not required for the second printer. All printer switching is handled electronically by the *Printer Enhancer.* If both printers are of the same or compatible types, the emulation features of your Commodore interface will be available with each one.

The *Printer Enhancer* setup is completed by setting the eight DIP switches located on its back panel (four for each printer). A built-in power up self-test feature lets you verify the settings of the DIP switches, as well as checking the *Printer Enhancer's* operation and RAM. Operation of the five front panel push-buttons may also be verified at this time. Pushing each one should generate a confirming message on your printer. Finally, all 10 of the front panel's LEDs light in a sequential "sweep" pattern to verify their operation.

The five front panel push-buttons give direct access to all of the *Printer Enhancer's* features. Two of these are the mandatory buttons for pausing operation and clearing the buffer. A third button lets you set the number of copies of the buffer contents to be printed. Up to 255 copies are possible. Note that the entire document will have to fit in the 64K buffer for this feature to work. A fourth button lets you select either or both printers. Judicious use of these buttons allows for several documents to be sent to the buffer and selectively routed to either printer. Of course, the total length of all documents must not exceed 64K.

The fifth button cycles the *Enhancer* through its eight built-in NLQ fonts. These fonts are generated using your dot matrix printer's high density dot graphics capabilities. They will not be available on printers which lack the requisite dot density. Supported printers are Epson, Star Micronics, Prowriter, C Itoh, and Blue Chip. All printers have settings for both narrow and wide carriage versions. Other ASCII printers may also be used without the benefit of the built-in fonts.

Since the fonts are generated internal to the *Enhancer,* the printer's built-in text features are not directly available. Several of these features have been incorporated into the *Printer Enhancer's* fonts. These include



Inside the* Printer Enhancer *we find a 6805 8-bit microprocessor, 64K of static RAM, and 32K of ROM. This prototype lacks twin shielded cables. READER SERVICE NO. 141

Printer Enhancer's *front panel displays no lack of buttons and lights.*

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expanded and compressed print, boldface, and underlining. The exact features will vary with the specific printer. To maintain compatibility with your existing driver software, the *Printer Enhancer's* control codes which select these features are identical to the codes on your printer.

Some of the printer features are also available from the *Printer Enhancer's* front panel by pressing the push-buttons in predefined combinations. The array of 10 LEDs function as indicators of the selected features by blinking in a prearranged pattern. In this case, it is the timing of the various flashes which conveys the information. Overall the scheme worked, although it was difficult to follow the blinking patterns. On the other hand, an easier to use arrangement would have more than doubled the total number of indicating lights and front panel switches.

The front panel feature selection was not designed to implement changes within the body of the text. These switches should be used for global settings for an entire document. Fine control of the text should be done using the traditional ESCape code sequences.

Operating speed of the *Printer Enhancer* is dependent on your installation. If the *Printer Enhancer* is installed after a Commodore-type printer interface, speed will be determined entirely by the characteristics of the interface. This will be on the order of 300 to 600 cps. Additional speed limitations may be imposed by your driving software, as was pointed out in the review of *Serial Box* above.

The greatest data transfer speed to the *Printer Enhancer* will be obtained with a direct parallel connection between the computer's user port and the *Printer Enhancer.* We achieved a data transmission rate greater than 1400 cps when using *Superscript 128* with the *Printer Enhancer* connected to the user port. The disadvantage of the user port connection is that the computer's operating system does not recognize this as a valid eight bit parallel port. This means that BASIC program listings or output cannot readily be sent to your printer. Soft-

USER PORT-TO-CENTRONICS CABLE

PARTS LIST

Item	Stock #	Price
36 Pin Centronics connector (solder type)	276-1534	$4.99
5' ribbon cable	278-772	$3.59

A 24-pin edge card connector (.156" x .200" spacing) is available for $2.90 (Part No. C1-12) from Digi-Key, 701 Brooks Ave. South, Thief River Falls, MN 56701 (phone: 1-800-344-4539).

CONNECTION TABLE

User Port			Centronics	
Pin	Type		Pin	Type
A	Ground	⇔	33	Ground
B	Flag2	⇔	10	Acknowledge
C	PB0	⇔	2	Data 1
D	PB1	⇔	3	Data 2
E	PB2	⇔	4	Data 3
F	PB3	⇔	5	Data 4
H	PB4	⇔	6	Data 5
J	PB5	⇔	7	Data 6
K	PB6	⇔	8	Data 7
L	PB7	⇔	9	Data 8
M	PA2	⇔	1	Data Strobe
N	Ground	⇔	16	Ground

ware drivers are available which will do the job. Of course these must be LOADed up and initialized before running your application. This is generally not possible with most commercial software.

Fortunately, many commercial programs contain the necessary routines to redirect output to a Centronics printer on the user port. Word processors in particular support this operating mode. *Vizawrite Classic* for the C-128 (Solid State Software) even offers an optional cable for this very purpose. Suitable cables may also be available from your Commodore dealer.

If you have the technical ability, a cable may be easily constructed from readily available parts. The table gives the Radio Shack parts list and the necessary connections for building your own user port-to-Centronics cable for the C-64 and C-128.

User port connections are as per the *Commodore 64 User's Guide* (page 143), or the *C-128 System Guide* (page 352). Note that the view shown in these books is looking at the computer from the back. If you do opt for the user port connection you should arrange for an easy means of reconnecting your printer to the serial port. This will allow the printer to be used with those programs that do not support the user port. It will also permit printer operation along with the modem.

At first glance the *Printer Enhancer* may seem like an expensive proposition for just a 64K buffer. However, if you are running two printers with your computer, the cost does not seem that extreme. In this case the overall price must include the cost of two printer interfaces and a serial port switch, or one printer interface and a Centronics A-B switch. The latter are typically $70. When you're done you will still lack the custom fonts and the built-in software selection of the printer as provided by the *Printer Enhancer.* Also keep in mind that nothing is as fast as a Centronics buffer connected directly to the user port.

Xetec, Inc., 3010 Arnold Road, Salina, KS 67401 (phone: 913-827-0685).

PARTNER 128

Timeworks, Inc.
Commodore 128
Cartridge; $69.95

The Commodore equivalent of IBM PC RAM-resident programs like Borland's *Sidekick, Partner 128* enhances the 128's overall capabilities, making it an even better small business machine. Like its forebears, this application provides a number of useful (though unrelated) tools designed to increase personal productivity.

8, 7, 6, 5...

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The memo pad is a mini-word processor with decent edit capabilities, flexible cursor control, and word wrap. Two nice touches are a BASIC search function (case insensitive) and typewriter emulation. The latter al-

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The publisher cannot assume responsibility for errors in the above listing.

REVIEWS

lows direct line-by-line output to a printer for labels, envelopes, forms, and other items which are traditionally difficult to do by computer. (Timeworks suggests the memo pad be used to write online help text. A great idea, if you're in the market.)

Unlike the free form nature of the 60-column memo pad, the address list locks users into a format of name, address, city, state, zip, and phone number. You must live not only with these field sizes, but also with the inadequacy of one address line.

Somewhat offsetting this rigid approach is the routine's sort feature, an intuitive, alphanumeric function which takes its cue from the field where the cursor is positioned. Now that's convenience. An auto dialer, supported by the database, is included for modem madness. Other peripheral, but more generally useful resources include the five function calculator with hardcopy capability and an

128 answer to **Sidekick** *for IBM PC.*
READER SERVICE NO. 193

interface to DOS. Though restricted to commands such as new, verify, initialize, rename, and scratch, such easy access is a boon under certain circumstances.

The ability to dump screen imag-

BUT HOW GOOD A PARTNER IS IT?

By now you are wondering if *Partner 128* works with your favorite (or eagerly anticipated) software. Since we don't want you to risk hard earned cash finding out, here's the compatibility lowdown.

Programs in which *P 128* ran with no problems whatsoever:

Fasthack'em (Basement Boys)
Jane (Commodore)
Brainstorm (Country Road Software)
dfile & wordfile 128 (michaelsoft)
Superbase (Precision)
Personal Accountant (Softsync)
Data Manager 128 (Timeworks)
Sylvia Porter's Personal Finance (Timeworks)
Word Writer 128 (Timeworks)

Programs which did not allow disk access until after <Commodore O>, the override command, was issued (beware—this command may damage data files):

Superscript (Precision)
Pocket Writer (<Commodore G> to make menus legible). (Digital)
Pocket Planner (<Commodore G> to make menus legible. Also, *P 128* does not work when displaying graphs). (Digital)

Programs which refused to access the disk drive, even after <Commodore O> was issued:

Fleet System 3 (Professional)
Swiftsheet (Cosmi)
Swiftcalc with *Sideways* (N.G. in graphics mode too). (Timeworks)

Not easily classified:

Multiplan (Epyx): SwiftLoad function of *P 128* interfered with loading. After <Commodore D> disabled SwiftLoad, *Multiplan* worked fine.

PaperClip (Batteries Included): *Partner 128* goes in Port 1, security key in 2, <Commodore O> corrects "No Disk Access" problem.

New Consultant (Batteries Included): *P 128* in Port 1, security key in 2, no problems after that.

Bobs Term 128 (Precision): *P 128* in joyport 1, security key in 2, <Commodore G> to make menus legible. All *P 128* functions worked fine.

Note: <CTRL (P128 BUTTON)> is correct procedure to call *P-128* in Port 1.

While this is not a complete list of 128 applications, it is representative of titles from some of the best-known software houses. (*Vizawrite* is not a *P 128* partner, since they both occupy the cartridge port. Slot extenders may help here, though there are no guarantees.)

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PaperClip contains over 30 printer files for all the current major models. The documentation is excellent and the disk itself unprotected, though keyed through a joystick port. This means you can make as many back-up copies as you like, but can use the program only when the key is inserted."–CREATIVE COMPUTING

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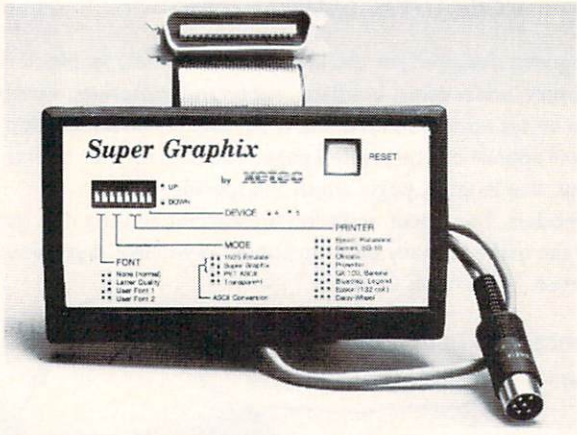

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es to a printer is good for programming and manual preparation. Unfortunately, it can only handle text; graphics are out of the question.

A security option entitled Swift-Lock makes it easy to leave an unattended 128 while preventing unauthorized tampering with files. As this can be circumvented by a warm reboot, it doesn't provide much protection against determined snoopers. Of course, it will deter the uninitiated or those without sufficient time to reboot and reload the coveted files.

The Fine Print

The manual goes to great lengths stating the need to use a data disk formatted just for *Partner 128*. The guide makes it seem as if regularly formatted floppies won't work. This is not the case. One word of warning is accurate, however; 128 virtuosos should not activate the cartridge during disk reads or writes. After all, "diskus interruptus" rarely does anyone any good.

Several 128 programs use a security key or dongle in Port 2, one of the places where *Partner* connects. For the most part these applications can still be used; merely plug *Partner* into Port 1 and the key into Port 2. Then call *P 128* with the following action: <CTRL (PARTNER 128 button)>. (Timeworks sells a Y cable adapter for these situations, though it is not necessary.)

Advanced (machine language) programmers can load other utilities into *Partner*, though this severely restricts file capacities. OUT OF MEMORY messages could become a painful way of life.

Do You Need a Partner?

Of course, you are the only one who can really tell. *Partner 128*, as noted in the sidebar, is highly compatible with most applications. Furthermore, it provides features not found anywhere else at any price.

However, a monopoly is no reason to buy a product. The real reasons for purchasing *Partner 128* include enhanced productivity, and unbeatable convenience.

Timeworks, Inc., 444 Lake Cook Road, Deerfield, IL 60015 (phone: 312-948-9200). *—Ted Salamone*

S.O.S.

No problem is too tough for *Ahoy!'s* crack technical crew. Just send your programming or hardware questions to: S.O.S., c/o Ahoy! Magazine, 45 West 34th Street—Suite 407, New York, NY 10001.

By Tim Little

I am using a Commodore 64 computer, two 1541 disk drives, and a 1660 modem with the Higgyterm terminal software (the program supplied by Commodore with the 1660). When I logged on to *Ahoy!'s* bulletin board, I was advised not to attempt to download programs unless I was using an 8-bit Punter terminal program.

What is the Punter protocol? What terminal software uses it?

—Robert H. Croswell
Trappe, MD

The Punter Protocol is a method of sending a data file from one computer to another computer. It sends the data in groups of bytes with a checksum byte transmitted after the receiving system declares that it is ready for another "packet" of data. After the checksum byte is verified with the computed checksum, it will either agree, in which case the next packet is transmitted; or a discrepency will have occurred, and the receiving system will ask the other system to transmit the data again until the checksums match. This insures an error-free file transfer, or at least reduces the probability of erroneous data being transmitted.

There are many terminal programs on the market as well as in the public domain. A few are Bob's Term Pro, Blitz Term, Eagle Term, First Term, Hal Term, Super Punter *and* Versa Term. *Check the package before you buy.*

Some of the programs I use will not allow me to print out parts of a report that can be displayed on the screen. Furthermore, these programs are protected so I can't modify them. The *Screen Dump* program (Aug. '85) could be of some use to me if I could use a function key that I could push any time I wanted to print out a screen display. Can you help?

—John Mackey
Creswell, OR

Unfortunately, unless you become quite proficient at machine language program deprotection and modification, the program Screen Dump *will be of no use in this respect. Most commercial programs incorporate protection schemes that will disable any utilities that are in the machine in order to boot, thus few commercial programs will allow any software screen dump programs to function.*

My suggestion is dependent upon your need to print

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out the information as well as the program you are using. Almost any cartridge-based screen dump will perform the task, and many are available at local software distributors. This is just a sampling:

Freeze Frame *(Cardco)*
Screen Dump Etc. *(IRQ, Inc.)*
HardCopy *(FS! Software)*

Be sure that the above programs will work with your specific printer as well as your specific program.

Many readers have complained that while writing their own programs, they have found serious bugs in the C-64's BASIC interpreter. One such bug is called the input-prompt bug and the only solution appears to be to avoid it altogether. The following reader offers a solution as well as the cause:

If an INPUT line contains a prompt (such as INPUT "Would you like a few more problems (Y/N)";A$) which contains 39 characters or more, or if the INPUT statement is preceded by a PRINT statement which contains a string of 39 or more characters and is followed by a semicolon, then the prompt in the INPUT or the string which follows the PRINT may become concatenated with the actual input variable. If the variable was a numeric variable, then the attempted combination with a string produces a REDO FROM START message on the screen. If the variable was a string (INPUT A$) then the combined input will be stored in the variable. This is obvious when you print out the new variable, but can wreak havoc when used in IF...THEN statements. —Jack Ryan
El Dorado, AR

His solution is to keep prompts to a 38 or less character minimum, and I do agree since this is not a real inconvenience.

After reading several books on bit mapped graphics on the C-64's high resolution screen, I noticed that all of them failed to mention how to turn off a pixel after turning it on. I would appreciate the formula in BASIC.
—Robert Cario
Merrick, NY

I will assume that you are familiar with the first five of the following six formulas. These formulas will let you turn off any pixel at location (X,Y) where X can range from 0 to 319 and Y can range from 0 to 199. BASE is the address of the hi-res screen.

```
ROW = INT(Y/8)
COL = INT(X/8)
LINE= Y AND 7
BYTE= ROW*320 + COL*8 + LINE + BASE
BIT = 7 - (X AND 7)
POKE BYTE,PEEK(BYTE) AND (255 - 2^BIT)
```

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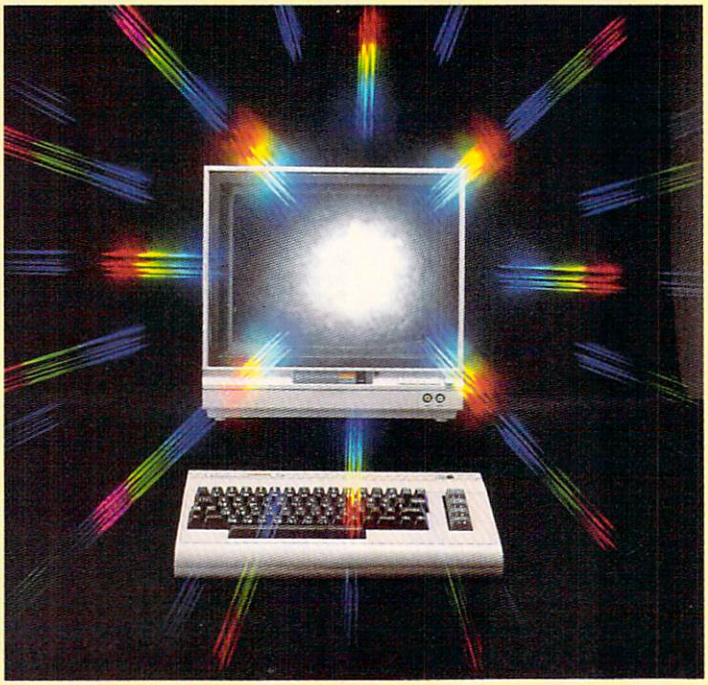

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LONG LINES

Code Consolidation for the 64

By Rick Nash

Long Lines is a short utility program that will improve the Commodore 64's line editor. As you probably know, the standard line length is 80 characters, or two screen lines. This utility will double the editor's capability to 160 characters (four screen lines).

The reason for longer BASIC lines is twofold. Programs will run slightly faster, and fewer lines means less memory overhead. Each BASIC program line requires a minimum of five bytes. For very large programs, combining many small lines into fewer long lines can result in substantial memory savings.

ENTERING *LONG LINES*

Enter and save a copy of the listing on page 132. This is a program generator which, when run, will produce a machine language program directly to tape or disk with the filename "LONG LINES". To use, simply LOAD "LONG LINES", dv,1 where dv is 8 for disk, or 1 for tape. Next, execute *Long Lines* with SYS 49152, and enter NEW. At this point, you can write or edit up to four screen lines for each BASIC line.

Programs written with long lines can be loaded, saved, or run without the utility, but do not edit any long lines, as they will be truncated to the normal 80 character length.

Both BASIC and the Kernal are moved to RAM, and heavily patched. You must reexecute *Long Lines* (SYS 49152) after a RUN STOP/RESTORE or a RESET. □

SEE PROGRAM LISTING ON PAGE 132

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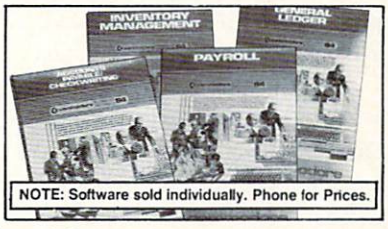

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GUARDIAN

For the C-64

By Cleveland M. Blakemore

In the year 4025, the star Sol far on the rim of the Milky Way spiral began to pass through a massive gas cloud, dragging the earth and surrounding planets with it. The gas cloud was no natural phenomenon left over from the Big Bang, but the debris and residue of one of the largest intergalactic wars ever fought.

The motives and identities of the long-dead civilizations that were involved are forever lost in the miasma of time, but unfortunately the machines they built to wage war for them are still functioning.

The other major planets have already been destroyed, and the earth is calculated to be next in line, although earth's scientists are not quite sure what is in store for us.

Reconaissance has revealed several synthetic moons with trenches running the circumference, ending in colossal pyramids topped with strange power crystals. The scientists know that the moons are in orbit with an artificial gravity well, a "black hole" which somehow draws its energy from the power crystal on top of the pyramid.

When the crystal lines up with the black hole, anything intersecting the conjunction will be annihilated. Earth's terrified masses have taken to calling the crystals "the eyes of doom."

Earth's greatest pilots have been scraped together amidst the hysteria to fly a suicide mission across the surface of the moon, through the trench towards the pyramid. Your mission is to destroy the pyramid before the black hole aligns with "the eye of doom." Just before the pyramid releases its deadly blast of energy, our scientists believe a second crystal opens at the base of the pyramid. If you can fire a laser torpedo down this opening, they believe the pyramid's power source will be knocked out of commission, and the earth will be saved!

In the 3-D game *Guardian*, you fly a shuttlecraft down a constantly scrolling trench, avoiding or blasting the weird machines that attack you in endless ranks, launched from the pyramid far away on the horizon.

The pyramid grows larger as you approach it, while the earth moves across the sky in the background. If you look closely, you may see the "black hole" as it approaches from the other side of the screen.

There are two types of flying machines that attack you: white alien fighter ships (500 points) and cyan fighter ships (1000 points). There are two types of ground rolling robots: light green (1500 points) and dark brown (2000 points).

Since the game is in 3-D, your altitude directly controls the height of your laser fire, so you must be at the same altitude to destroy an alien fighter craft. You can judge the height by looking at the distance between the fighter ship and its shadow. To dive, push up on the joystick. To fly higher, pull back. Your shadow shows you the approximate distance from the moon's surface. When you are lined up with a ship in flight coming at you, your shadow should appear to be approximately the same distance from your ship as his.

The robots are a different menace altogether. They have slits in the front of their chassis, the only weak spot in their armor. Fire a shot through this slit and the robot will be nuts and bolts. The robot has a very high reach with his electronic arms, so you will have to get some altitude to fly over him! Once you get the height correct, you can sit in place and plink at robots all day long and rack up points.

Avoid the plasma balls the aliens fire at you as they approach.

The best shot at an alien comes as they appear on the horizon. As they get closer, you have to be more accurate with the altitude.

The power crystal appears as a flashing eye at the base of the pyramid. You have only seconds to hit it before the earth explodes. If you successfully knock a pyramid out, the screen colors change, and you are on the surface of another guardian moon. The aliens get progressively faster each time you wipe out a pyramid, so you will have to be more tricky in avoiding them and more selective with your shots.

You only have three ships in the game, displayed at upper right. The current score is at upper left in yellow.

This game uses extended background mode for the scrolling color bars, rotating the three colors to give the illusion of motion. This is an ancient trick on the Commodore, and highly effective, even in BASIC programs. (Although the idea is simple enough and very snazzy, I think we have yet to see some of the incredible games that could be created with EBC mode.) The pyramid itself is constructed with redefined character graphics.

My high score so far is 54500. It is theoretically possible to flip the game over past 650,000, but even I would do a double take on that one. If you should flip this game over, please let me know via a letter to *Ahoy!*, and I will incorporate a three byte scoring system in my next game to keep you joystick superjockeys happy!

Enjoy *Guardian*.

Now save the earth! □

SEE PROGRAM LISTING ON PAGE 137

Back Issues

SPECIAL ANNOUNCEMENT
A small cache of *Ahoy!* #2 (Feb. '84) has been uncovered, and is available at $10 per copy while limited supplies last.

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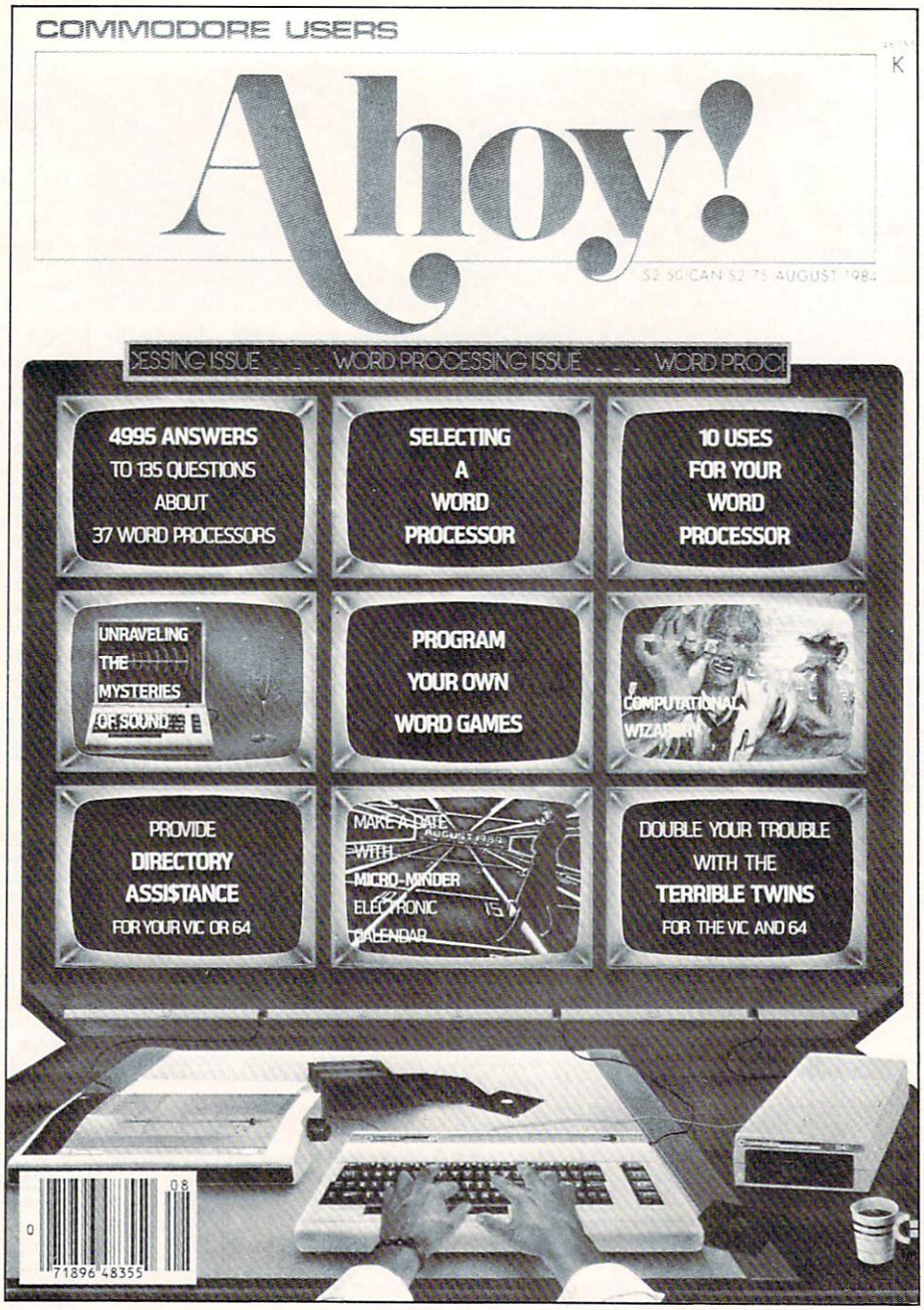
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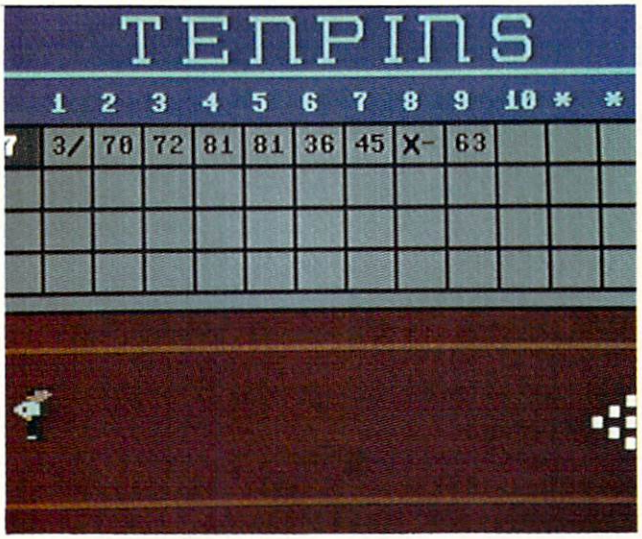


Bowling Simulation for the C-64

By Tony Brantner

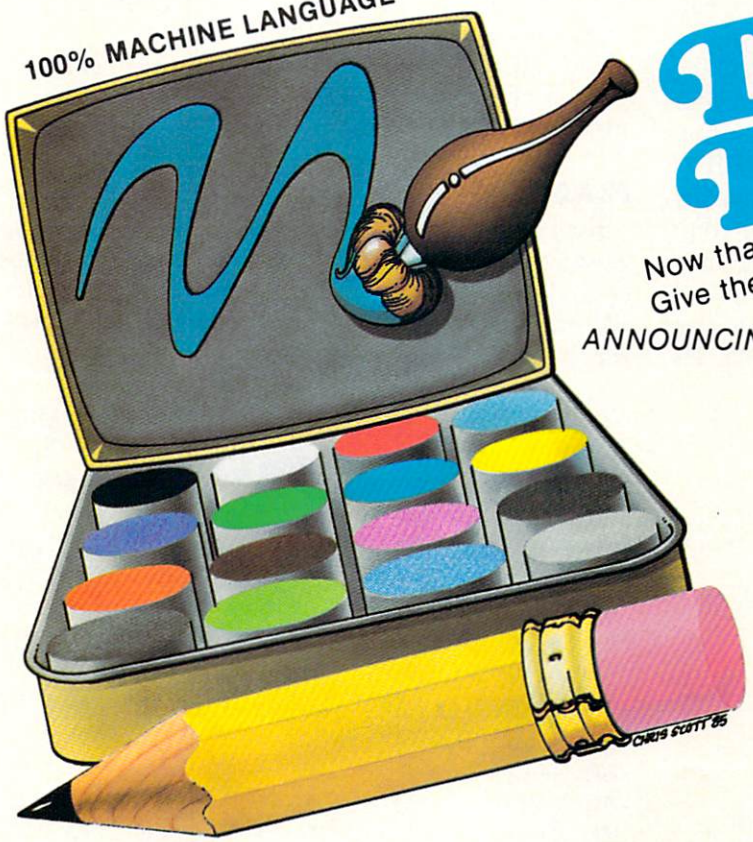
Tenpins is a bowling simulation which offers the user something a bit different from most computer games. There is no time limit to worry about, no violent theme, and up to four people can participate. All you need is a single joystick, plugged into Port 2, which can be shared by all the players.

Moving the joystick up or down moves the bowler on-screen in that direction. Press the fire button when you are ready to release the ball. One advantage *Tenpins* has over most other bowling games is that you can "steer" the ball up or down after its release. Don't roll it to the sides of the alley, though, or you'll lose control. Your score is displayed on a scorecard above the alley, and your total, which is shown to the left of the scorecard, is updated after you finish your frame.

Scoring is just like in regular bowling, your total in each frame depending on what you roll. Knock down all ten pins in one roll (known as a strike), and you'll receive ten points plus the total of the next two rolls. Knock down the pins in two rolls (a spare), and you'll receive ten points plus the total of your next single roll. It should be noted that your score for that frame won't be totalled until you make the next roll(s). If any pins remain after two rolls (an open frame), then the number of those knocked down is added to your score. Rolling a strike in the tenth frame earns you two extra rolls, while a spare in that frame earns you one. □

SEE PROGRAM LISTING ON PAGE 125

100% MACHINE LANGUAGE



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Compiled by Michael R. Davila

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USING 128 COMMANDS IN 64 MODE

When developing Commodore programs to run in 64 or 128 mode, you sometimes cannot find a substitute for BASIC 7.0 commands. These keywords will not load or save correctly on a 64. They can, however, be embedded in PRINT statements and executed on a 128 using the dynamic keyboard technique. An example follows. It changes the 80 column screen color. This cannot be done with POKEs.

—Edward Horgan
Coatesville, PA

```
•10 IFFRE(0)<>FRE(1)THENGOSUB1000
•20 END: REM PROGRAM STARTS HERE
•1000 PRINT"[CLEAR][4"[DOWN]"]COLOR6,2:CO
 NT[3"[UP]"]"
•1010 POKE842,13:POKE208,1:END:RETURN
```

20 PROGRAMMABLE FUNCTION KEYS

The 128 has the ability to perform a whole series of commands with the touch of a single function key. Two problems though: There are only eight keys, and the buffer for storing all key definitions is only 245 bytes.

The method below cures both annoyances by defining the function keys to call a subroutine appended to your program. When implemented, the routine checks location 211 to see if the SHIFT, COMMODORE, SHIFT/COMMODORE, or ALT keys are pressed. Depending on the combination, up to 20 separate routines or commands can be executed with a single stroke. The only limit on length is the amount of available RAM.

—Edward Horgan
Coatesville, PA

```
•10 KEY 1,"GOTO9000"+CHR$(13)
•20 KEY 2,"GOTO9000"+CHR$(13)
•100 REM SHIFT
•200 REM COMMODORE
•300 REM SHIFT & COMMODORE
•400 END:REM ALT
•9000 IFPEEK(211)=0 THEN LIST
•9010 IFPEEK(211)=1 THEN LIST-100
•9020 IFPEEK(211)=2 THEN LIST-200
•9030 IFPEEK(211)=3 THEN LIST-300
•9040 IFPEEK(211)=8 THEN LIST-400
•9050 END
```

TWO FOR ONE

Hearing my computer constantly BEEPING and BUZZING to get my attention prompted this routine. The routine sounds a pleasant bell after printing "PRESS A KEY TO CONTINUE" on the screen.

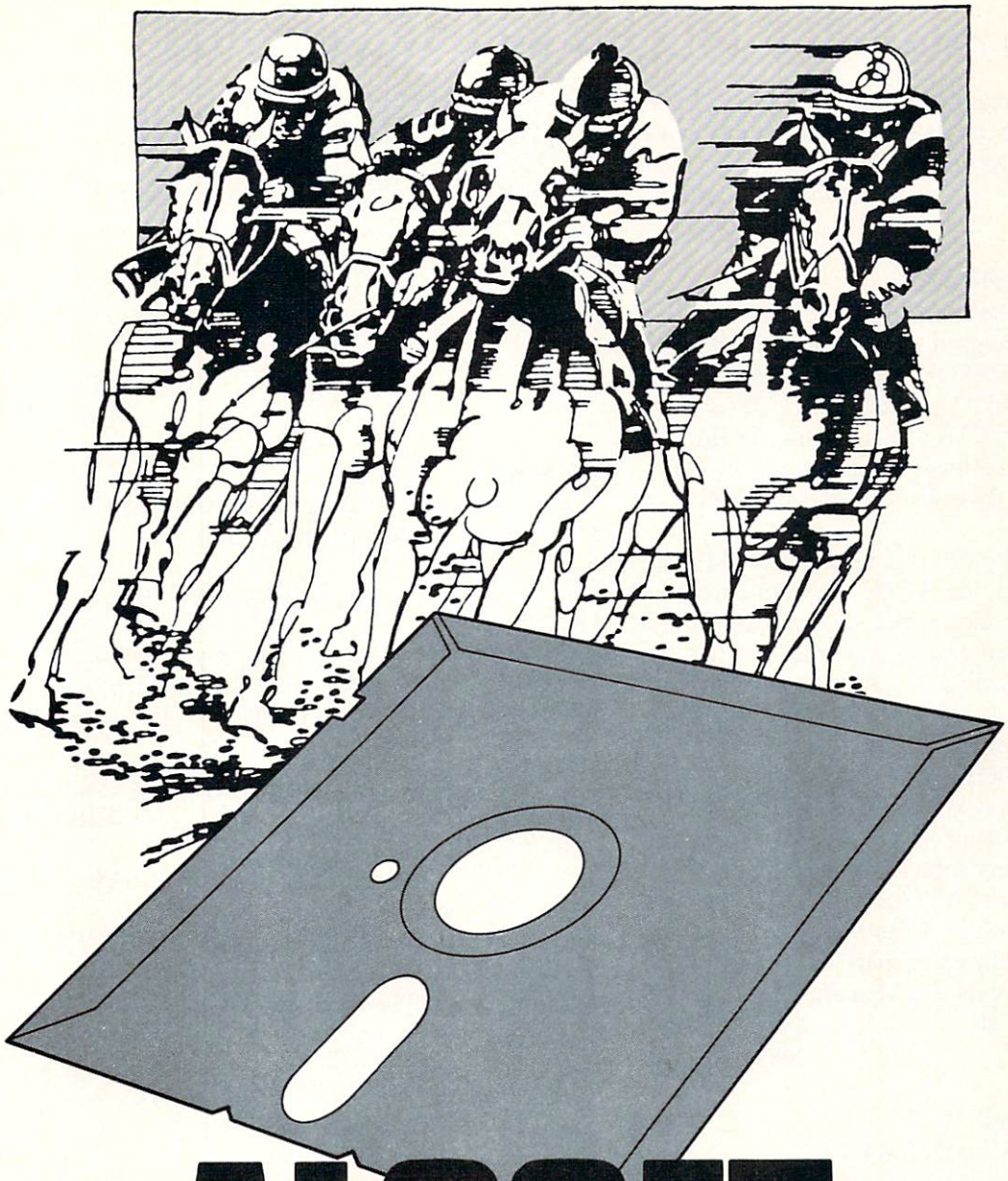
This was all well and good, but the "feature creature" (the little voice that keeps saying "yes, but wouldn't it be better if...") decided a simulated PRINT@ command, to control where the message printed, would be a good way to avoid destroying an aesthetic screen display. To position the cursor anywhere on the screen use line 1010. Note that by entering the KERNAL PLOT routine with SYS 58640 instead of SYS 58634, the routine will work regardless of the status of the carry flag. —Bob Ash
APO, NY

```
•10 REM ** TUNEFULL DELAY ROUTINE **
•20 ROW=24:COL=8
•30 GOSUB 1000
•40 END
•1000 REM ** SIMULATED PRINT-AT **
•1010 POKE214,ROW:POKE211,COL:SYS58640
•1020 REM ** DELAY ROUTINE **
•1030 PRINT"[RVSON] PRESS A KEY TO CONTIN
 UE "
•1040 REM ** RING BELL UNTIL KEYPRESS **
•1050 S=54272:POKES+24,15:POKES+1,112:POK
 ES,194: POKES+5,12:POKES+6,9
•1060 GETC$:IFC$="" THEN POKES+4,21:POKES
 +4,20:FOR T=1TO700:NEXT T:GOTO 1050
•1070 RETURN
```

FLASHER

Here's a little ML routine you can use to brighten up those instructions, displays, or hi-scores. It only takes up 22 bytes, and is totally relocatable. Just change the address in line 10 to somewhere it doesn't interfere with your program and the operating system.

```
•0 SL=828:REM CHANGE SL TO STARTING ADDRE
 SS
•10 POKE 53281,0:POKE 53280,0:REM BACKGRO
 UND AND BORDER
•20 FOR X=SL TO SL+21:READC:POKEX,C:NEXT
•30 DATA 138,153,0,216,153,250,216,153,24
 4,217,153
•40 DATA 238,218,200,232,192,251,144,237,
 160,0,96
•50 PRINT"[CLEAR]":FOR X=1 TO 10:PRINT"TE
 ST[DOWN][DOWN]";:NEXT
•60 GETA$
•70 FOR T1=1 TO 40:NEXT T1:REM CHANGE 40
 TO MAKE FLASH FASTER OR SLOWER
•80 IF A$=""THEN SYS SL:GOTO 60
```



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```
•90 PRINT"[CLEAR][DOWN]BACK TO NORMAL"
```

To me a black background and border looks best. After selection is made, just clear the screen and continue with program. I hope you can use this in some of your programs.

—Robert M. Hickey
APO, SF

VARTAB CALCULATOR

Programmers who often load machine language programs may have experienced more than their share of OUT OF MEMORY ERROR's. This is caused by the fact that the end of BASIC pointer (VARTAB) is used as an index during loads. This works just fine for BASIC, but after a non-relocating load, this pointer is moved to point to the end of the data that was loaded, whether it was BASIC or not.

Below is a short utility that will recalculate VARTAB by counting the bytes in the BASIC program currently in memory. It is 100% relocatable, so it may be moved from location 679 by changing the variable L on line 10. Wherever it is located, SYS 2 will always activate it.

To demonstrate its use, suppose you are writing a BASIC program and decide that you need the DOS wedge, so you LOAD"DOS 5.1",8,1 and SYS 52224. Now almost anything you do will cause an OUT OF MEMORY ERROR. Simply enter SYS 2 and the program is left intact and the pointers point to the right places. This program will also restore VARTAB if it has been altered in some other way. A word of caution, though. It will truncate anything after the zeros marking the end of the BASIC program, so any data hidden after the program will be lost if it is saved.

—Danny Faught
Sherman, TX

```
•1 REM VARTAB CALCULATOR
•2 REM DESIGNED BY DANNY FAUGHT
•10 L=679:HI=INT(L/256):LO=L-HI*256
•20 POKE2,76:POKE3,LO:POKE4,HI
•30 FORX=LTOL+52:READA:POKEX,A:CK=CK+A:NE
XT
•40 IFCK<>6541THENPRINT"[DOWN]DATA ERROR
- RECHECK DATA STATEMENTS":END
•50 PRINT"[8" "]VARTAB CALCULATOR READY":
PRINTTAB(11)"SYS 2 TO ACTIVATE"
•100 DATA 165,43,133,45,165,44,133,46,160
,0,177,45,240,7,200,208,249,230,46,208
•110 DATA 245,200,177,45,208,240,200,177,
45,208,235,200,152,24
•120 DATA 101,45,133,45,133,47,133,49,165
,46,105,0,133,46,133,48,133,50,96
```

64 MEMORY REMINDER

When I'm working with a large program with a lot of string data, I want to be careful not to run out of memory. During program development, I keep a menu option to end the program. At the end of the exit routine, I insert the following lines to let me know how I'm doing with memory consumption:

```
Y = PEEK(52)*256 + PEEK(51)
PRINT "BOTTOM OF STRING STORAGE: ";Y
Z = PEEK(50)*256 + PEEK(49)
PRINT "      END OF ARRAY SPACE: ";Z
PRINT "
--"
X = Y - Z
PRINT "   REMAINING FREE MEMORY: ";X
```

—Thomas P. Shultz
Clarion, PA

E-Z DATA

Entering tons of DATA statements on the C-128 is a snap if you RUN this program first:

```
•10 IF DS$ THEN FAST: GOTO30: REM CHECK C
 OMPUTER TYPE
•20 PRINT"COMMODORE 128 REQUIRED.":END
•30 FOR X=1TO8:KEYX,"DATA":NEXT:REM NOW A
 NY FUNCTION KEY WILL PRINT THE WORD 'DAT
 A'
•40 FOR X=0TO88:POKE6912+X,PEEK(64128+X):
 NEXT:REM COPY ROM KEYBOARD DECODER TABLE
  INTO RAM
•50 POKE 830,0:POKE831,27:REM CHANGE POIN
 TERS TO RAM
•60 POKE 6994,44:REM CHANGE PERIOD TO A C
 OMMA
•70 FOR X=842TO847:READ B$:POKEX,ASC(B$):
 NEXT:POKE848,13:POKE208,7:REM ACTIVATE A
 UTO LINE NUMBERING
•80 DATA "A","U","T","O","1","0"
•90 SLOW
```

What we've done is program all the function keys to print the word "DATA", changed the numeric keypad's period to a comma, and activated the 128's line-numbering utility (instead of 10—the "1" and "0" in line 80—use whatever increment matches the program you are entering). Now you can type entire DATA statements with one hand, leaving the other hand free to keep your place in the *Ahoy!* listing.

Important: If you own an international model 128 (it has an ASCII-DIN key instead of a CAPS-LOCK key) you must add:

```
45 POKE 2757,PEEK(2757) OR 128: REM DISA
BLE POINTER RESET
```

—Bert Halverson
Joplin, MO

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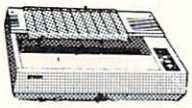

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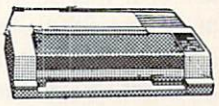

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When it is run, your specially prepared program will be made invisible to the C-64 LIST command and consequently also to all but the most determined of the curious.

Type in the program below, save a copy, and run it. This installs the routine into memory. Now load the program you wish to hide. This source program must be prepared in the following way before activating the *Hider* or it will be ruined: Using the insert mode, add exactly five colons between the line number and the first command. A space after the line number is okay, but no other spaces can appear between the first colon and the first command. These colons must be added to each and every line. To illustrate, the program

```
10 PRINT"HELLO"
20 GOTO 10
```

would be changed to

```
10 :::::PRINT"HELLO"
20 :::::GOTO 10
```

When the program is ready, type SYS 49152 in the direct mode. Not much seems to happen, but type LIST and see! Your new program can be saved and loaded like any other BASIC program, but studying or modifying it is a bear.

—Paul Sobolik
Pittsburgh, PA

```
·100 ML=49152:PRINT"[CLEAR][DOWN]REMEMBER
 : PREPARE BASIC PROGRAM TO BE"
·110 PRINT"HIDDEN PRIOR TO ACTIIVATING BA
 SIC HIDER"
·120 FORX=0TO66:READA:POKEML+X,A:CK=CK+A:
 NEXT
·130 IFCK<>8519THENPRINT"ERROR IN DATA ST
 ATEMENTS":END
·140 PRINT"[DOWN]SYS49152 TO ACTIVATE"
·150 DATA 169,1,133,251,169,8,133,252
·160 DATA 160,0,177,251,240,45,153,253
·170 DATA 0,200,192,2,208,244,32,45,192
·180 DATA 160,0,177,253,240,32,153,251
·190 DATA 0,200,192,2,208,244,32,52,192
·200 DATA 32,8,192,160,4,169,0,145,251
·210 DATA 96,160,4,169,0,145,253,96,32
·220 DATA 45,192,96,32,52,192,96
```

PRINTING THE LAST LINE

Below is a routine I developed for printing menus on the last line of the screen. Lines 35 and 70 offer two methods of printing text at the bottom right-hand corner of the screen without a carriage return. CHR$(148) (line 35) is the INSERT character which shows as a reversed T (line 70) when used inside quotes. Also utilized in this routine is the WAIT 198,1 function, which waits for a key to be pressed. Lines 50-60 position the cursor at a specific screen location (JJ is row#, KK is column #).

—Steven G. Eason
Wichita, KS

```
·5 POKE53281,0:POKE53280,0
·10 JJ=22:KK=0:GOSUB50:PRINT"[RVSON][RED]
 PRESS ANY KEY TO CONT[c +][3" "]";
·20 PRINT"[RVSON][RED]SYST STATUS [BLUE]O
 K ";
·30 PRINT"[RVSON][GREEN]  F1 [s B]  F2 [s
  B]  F3 [s B]  F4 [s B]  F5/F7 [s B] CRS
 R";CHR$(94)CHR$(32);
·35 PRINT"[RVSON]MAIN [s B] SUB [s B]SC.P
 R[s B]HR.PR[s B]H/L TOG [s B]SCROLL[6"[L
 EFT]"]"CHR$(148)" ";
·40 WAIT198,1:GETG$:IFG$=""THEN40
·41 STOP
·42 REM ****************
·43 REM PRINT AT ROUTINE
·44 REM ****************
·50 PRINT"[HOME]";
·55 IFJJ<>0THEN POKE214,JJ-1:PRINT
·60 POKE 211,KK:RETURN
·65 REM *********
·66 REM ALTERNATE
·67 REM *********
·70 PRINT"[RVSON]MAIN [s B] SUB [s B]SC.P
 R[s B]HR.PR[s B]H/L TOG [s B]SCROL [LEFT
 ]L";
```

REMFIX

If your renumber utility scans instead of skipping past the text of REM statements, you can make it "fix" any line numbers referred to in explanatory REMs simply by POKEing a GOTO token into an otherwise blank space preceding the target number. Put the text of the REM statement inside quotes to prevent the LIST command from expanding the token. Example:

```
299 H7=PEEK(61)+256*PEEK(62):POKE(PEEK(H
7+1)+256*PEEK(H7+2)+11),137
300 REM "LINE 470 CALCULATES FREQUENCY N
UMBER FOR VOICE ONE"
301 STOP
```

In the example, Line 300 is a permanent program line. Lines 299 and 301 are temporary and should be deleted after doing RUN 299. A renumber utility will now treat the number 470 in Line 300 exactly the same as any other GOTO destination line number. Note the important number 11 near the end of Line 299. It is a sort of index number that represents the location of the blank space, and may be different each time you use the procedure. You must make it equal to the number of characters that follow REM, over to and including the blank space, plus four. If your REM statement holds several line numbers to be fixed, simply make sure each is preceded by a blank space, change the index number in Line 299, and RUN

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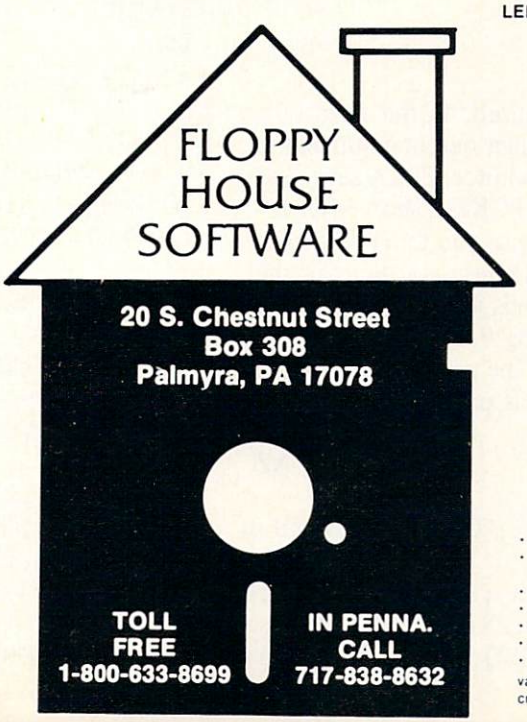

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it again.

—C.C. Stalder
Waynes, NC

LIGHTS OUT

If that flashing red light on the 1541 is trying your patience, turn it out—with *Lights Out*. *Lights Out* tells you what error crept into the 'ol disk drive and mercifully douses the light. It's easy to use and works with both the C-64 and VIC 20.

First load and run *Lights Out*. Now you can load and save all the programs you want. Whenever you need to read an error channel (because that red light won't quit winking at you), type SYS 980 and press RETURN. Presto, you'll see what went wrong, and the panic light will go out.

Lights Out loads into the cassette buffer from 980 to 1018. If necessary, you can relocate it by changing the variable for the starting address (SA), in line 30, to the new starting address. Be sure the new location has room for it (39 bytes). Everything else is automatic.

—Buck Childress
Salem, OR

```
·10 REM *** LIGHTS OUT *** BUCK CHILDRESS
  *** SALEM, OR 97309
·20 PRINTCHR$(147)"LOADING DATA":PRINT
·30 SA=980:REM CHANGE THIS TO RELOCATE
·40 FORJ=SATOSA+38:READA:POKEJ,A:X=X+A:NE
 XTJ
·50 IFX<>5736THENPRINT"ERROR IN DATA":END
·60 PRINT"DATA OK":PRINT:PRINT"SYS"SA"TO
 ACTIVATE":END
·70 DATA169,15,168,162,8,32,186,255,169,0
 ,32,189
·80 DATA255,32,192,255,162,15,32,198,255,
 32,207,255
·90 DATA201,13,240,5,32,210,255,208,244,3
 2,231,255,76,204,255
```

MONAID

Here is an 80 byte ML program, in the form of a BASIC loader, which adds a printer output command to the C-128's machine language monitor. Enter, save, and run *Monaid*. The program will POKE a short ML program into memory and then advise you to SYS 3504 to enable. Executing the SYS will cause you to enter the monitor with two extra commands available, P (printer on) and O (printer off). Selecting P will direct the output of all monitor commands to the printer. Selecting O turns the printer off and redirects output to the screen.

—Bob Ossentjuk
Sierra Vista, AZ

```
·3468 PRINT"[CLEAR][DOWN]LOADING MONAID D
 ATA, PLEASE WAIT"
·3480 FORX= 3504 TO 3583 :READA:CS=CS+A:P
 OKEX,A:PRINT".";:NEXTX:PRINT
·3492 IFCS <> 9012 THENPRINTCHR$(7)"DATA
 ERROR!":STOP
·3504 DATA  169, 194, 141, 46, 3, 169, 13
 , 141, 47, 3, 32, 125
·3516 DATA  255, 7, 0, 76, 33, 176, 201,
 80, 240, 7, 201, 79
·3528 DATA  240, 36, 76, 6, 176, 32, 125,
  255, 7, 13, 0, 169
·3540 DATA  0, 141, 0, 255, 32, 189, 255,
  169, 4, 170, 160, 1
·3552 DATA  32, 186, 255, 32, 192, 255, 1
 62, 4, 32, 201, 255, 76
·3564 DATA  139, 176, 169, 0, 141, 0, 255
 , 169, 4, 32, 231, 255
·3576 DATA  32, 125, 255, 7, 0, 76, 139,
 176
·3588 PRINT"[DOWN][DOWN]SYS 3504 : REM TO
  ENABLE[3"[UP]"]":NEW
```

REVERSE VIDEO

The Commodore 128 has a feature that turns the 80-column screen into reverse video when ESC and then R is pressed. This sounds impressive; however, when I purchased my system, I did not obtain the necessary accessories to produce 80-column output. Therefore, I wrote *Reverse Video* for my 40-column screen. It will turn anything that is reversed to non-reversed and anything that's non-reversed into reversed.

Below are totally relocatable versions for the C-128 in 40-column mode and the C-64. An SYS to the starting address will instantly perform the deed.

Note that the last three lines of the loader are there just to offer a quick example.

—Shawn K. Smith
Bronx, NY

```
·1 REM  REVERSE VIDEO BY SHAWN K. SMITH
·2 REM  FOR C64 OR C128 IN C64 MODE....
·3 S=00830:FORD=STOS+20:READY:POKED,Y
·4 NEXT:PRINT"[RVSON]SYS"S" FOR REVERSE V
 IDEO!
·5 DATA 234,162,024,160,039,032,240,233
·6 DATA 177,209,073,128,145,209,136,016
·7 DATA 247,202,016,239,096
·9 FORD=0TO39:A$=A$+CHR$(32):NEXT:N=99
·10 FORD=1TO16:POKE646,D:PRINTA$;:NEXT
·11 FORT=1TON:FORD=1TON-T:NEXT:SYSS:NEXT
```

```
·1 REM REVERSE VIDEO BY SHAWN K. SMITH
·2 REM FOR C128 IN 40 COLUMN MODE ONLY
·3 S=5555:BANK (1+2+3+4+5):PRINT
·4 FORD=STOS+23:READY:POKED,Y:NEXT
·5 PRINT"[RVSON]SYS"S"[RVSOFF]FOR REVERSE
 VIDEO!
·6 DATA 165,215,208,019,162,024,160,039
·7 DATA 032,094,193,177,224,073,128,145
·8 DATA 224,136,016,247,202,016,239,096
·9 FORD=0TO39:A$=A$+CHR$(32):NEXT:N=99
·10 FORD=1TO16:COLOR5,D:PRINTA$;:NEXT
·11 FORT=1TON:FORD=1TON-T:NEXT:SYSS:NEXT
```

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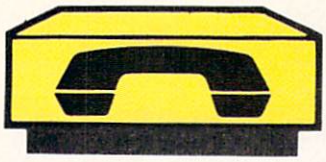

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COMMODARES
PROGRAMMING CHALLENGES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette (1541 format only) are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares*!

PROBLEM #35-1: ROUND ABOUT

This problem was submitted by Bill Sinclair Jr. of Hurlock, MD. The user inputs a string, and the computer scrolls it counterclockwise in a marquee fashion around the outer perimeter of the screen. The string will start on the top line of the screen and crawl down the left side of the screen. As it moves across the bottom line of the screen, it will be in reverse order. Then it crawls up the right side, and the process is repeated. (Bill suggests that you more advanced programmers do this as a machine language interrupt routine so the message could be displayed during another program.)

PROBLEM #35-2: SERIES SEQUENCE

James Bickers (Shepherdsville, KY) suggested this problem for you baseball and/or permutations fans. In a seven-game World Series, games are played until one team has won four games. Write a program which displays all possible win/loss sequences for the winning team. A few possibilities are

```
W W W W
W W W L W
W L L W W W
L L L W W W W
```

Can your program be easily modified to handle any series of X wins out of Y (maximum) games?

PROBLEM #35-3: TIME CONVERTER

Jim Speers (Niles, MI) suggested this little challenge. The user enters a number of hours in decimal format, and the computer converts it to hours:minutes:seconds format. For example, 6.42135 becomes 6:25:17.

PROBLEM #35-4: BAD LUCK

Here is a possible application of the Date Ditty solutions discussed below. The user enters today's date, and the computer responds with the date of the next Friday the 13th. Good luck.

This month we will look at readers' solutions to *Commodares* from the July 1986 issue. *Problem #31-1: Date Ditty* brought numerous solutions. The problem was for the computer to give the day of the week for any date in the 1900's. A programming "ditty" is meant to be a small, single-purpose routine. The solutions ranged from very short programs that work for most days in the twentieth century to much longer programs that give valid results from the year 100 AD to 2099 AD.

One of the shortest programs is listed below, from Keith Kushner (Brooklyn, NY).

```
·1 REM COMMODARES PROBLEM #31-1:
·2 REM      DATE DITTY
·3 REM SOLUTION BY
·4 REM      KEITH KUSHNER
·5 REM
·10 REM -VALID FOR 1900'S AFTER 2/28/1900
·20 REM -ENTER JULY 4, 1986 AS 7,4,86
·30 REM
·40 FOR N=0 TO 6:READ D$(N):NEXT
·50 DATA SATURDAY,SUNDAY,MONDAY,TUESDAY,W
 EDNESDAY,THURSDAY,FRIDAY
·60 INPUT"M,D,Y";M,D,Y:IF M<3 THEN M=M+12
 :Y=Y-1
·70 N=D+2*M+INT(.6*(M+1))+Y+INT(Y/4)+3 :
 N=INT((N/7-INT(N/7))*7+.5):PRINT D$(N)
```

Keith's program doesn't allow for the fact that the year 1900 was *not* a leap year, so January and February dates for that year are given as a day earlier than they should be. For example, January 1, 1900 was a Monday, not a

Sunday as the program says. Of course, it wouldn't take much effort to check for those two months and fix the program. Give it a try.

Most of the programs submitted allow the user to enter almost anything for the date. The following program from Karen Middaugh (San Diego, CA) adds error-checking to make sure that only valid dates are given.

```
·1 REM COMMODARES PROBLEM #31-1:
·2 REM      DATE DITTY
·3 REM SOLUTION BY
·4 REM      KAREN MIDDAUGH
·5 REM
·10 DIM K(12):FOR I=1 TO 7:READ D$(I):NEX
 T:FOR I=1 TO 12:READ K(I):NEXT
·20 INPUT "INPUT YEAR: 19";Y
·30 INPUT"INPUT MONTH (1-12): ";M :IF M<1
  OR M>12 THEN 30
·40 INPUT "INPUT DAY: ";D :IF M=2 AND D>2
 8 AND (Y/4<>INT(Y/4) OR Y=0) THEN 40
·50 IF (M=4 OR M=6 OR M=9 OR M=11) AND D>
 30 THEN 40
·60 IF D<1 OR D>31 OR (M=2 AND D>29) THEN
  40
·70 L=INT((Y+3)/4):DA=6+Y+L+K(M)+D :IF IN
 T(Y/4)=Y/4 AND M>2 THEN DA=DA+1
·75 IF Y=0 AND M<3 THEN DA=DA+1
·80 IF DA>7 THEN DA=DA-7 :GOTO 80
·90 PRINT M"/"D"/"Y" IS A "D$(DA)"DAY"
·100 DATA MON,TUES,WEDNES,THURS,FRI,SATUR
 ,SUN,0,3,3,6,1,4,6,2,5,7,3,5
```

Don't try to enter February 29, 1900 into this program. It allows only valid months and their corresponding days to be entered. The IF/THEN statement in line 40 determines if a date of 29 or greater is entered for February in a non-leap year. Notice that Y/4 is an integer for leap years. The Y=0 condition handles the special case that 1900, by definition or agreement, was not a leap year.

Line 50 implements the expression "Thirty days hath September, April, June, and November," and line 60 checks the other months. From line 40, a February date greater than 28 is allowed only in a leap year. Line 60 makes sure that any such date is not more than 29. The heavy work is done by line 70. Line 75 fixes the January, February 1900 dilemma discussed earlier. Line 80 implements the MOD 7 function. This line repeatedly subtracts 7 from a number until the result is between 0 and 6. Compare this line with the corresponding statement in line 70 of Keith's program:

```
N = INT((N/7 - INT(N/7))*7 + .5)
```

The repeated subtraction works fine but it can take quite a while if the original number is large.

There were nearly as many algorithms for calculating the day as there were programs submitted. The use of "month values" in Karen's program reminded me of the discussion of this problem in Martin Gardner's book *Mathematical Carnival* (Vintage, 1977). Martin Gardner presents a procedure (originated by Lewis Carroll in 1887) by which anyone can mentally calculate the day of the week for any date. The procedure involves being able to "cast out 7's" and requires memorizing 12 simple month values. You too can amaze your friends with your mental prowess. The calculations can be performed in your head in less than 30 seconds with practice. Who needs a computer?

Doug Vanderploeg (Norwich, CT) sent a lengthy program which he claims will handle all dates from 01JAN 0100 to 31DEC2099. It takes into account the change to the calendar in 1752 made by Pope Gregory XIII in which 11 days were dropped. (The day after September 2, 1752 was September 14, 1752 in the English-speaking countries.) If you want a listing of Doug's program, send a legal size, self-addressed, stamped envelope to me with your request clearly stated. Look into Gardner's book or an encyclopedia for more information on calendars.

Problem # 31-2: Cryptic Math was just plain tedious. The problem was to find which permutations of the numerals 0 through 9 make this expression true: AB * CDE = FGH * IJ, where each letter represents a different numeral. There are only 10! (ten factorial) possibilities, since there are ten choices for A, nine choices for B once A has been picked, eight choices for C, and so forth. The total is 10*9*8*7*6*5*4*3*2*1 or 3,628,800.

Congratulations to Dennis McGrath (Cicero, IL) who wrote his first major program in COMAL 2.0 to solve this problem. He realized that BASIC was not going to be fast enough. Dennis' four page (double spaced) program found 198 solutions in an elapsed time of 2,505,027 jiffies. That translates to just under 12 hours. Send me a legal size, self-addressed, stamped envelope if you are interested in seeing Dennis' COMAL solution. He found the high product to be 58560 (80*732 = 915*64) and the low product to be 3588 (23*156 = 897*04).

Paul Sobolik (Pittsburgh, PA) wrote the following BASIC program, based upon the permutation scheme from Allan Flippin in the April 1986 *Commodares*.

```
·1 REM COMMODARES PROBLEM #31-2:
·2 REM      CRYPTIC MATH
·3 REM SOLUTION BY
·4 REM      PAUL SOBOLIK
·5 REM
·10 CLR : DIM C(9) : S$="9876543210"
·20 J=9
·30 W=VAL(LEFT$(S$,2)):X=VAL(MID$(S$,3,3)
 )
·40 Y=VAL(MID$(S$,6,3)):Z=VAL(RIGHT$(S$,2
 ))
·50 IF W*X=Y*Z THEN PRINT W"*"X"="Y"*"Z
·60 S$=LEFT$(S$,J-1)+RIGHT$(S$,10-J)+MID$
 (S$,J,1)
·70 C(J)=C(J)+1 : IF C(J)<=10-J THEN 20
·80 C(J)=0 : IF J>1 THEN J=J-1 : GOTO 60
```

Add line 55 PRINT W,X,Y,Z to see how the program works. After running this program, Paul realized why people go out and buy Cray-2 supercomputers. Paul's program had churned out only 27 solutions in over 19 hours of running when he took the philosophical attitude that "the problem is solved, so who cares about the solution?" At that rate, the program would be done in less than 6 days. Evidently Paul had better things to do with his computer. Congratulations also to David Shiloh (Eugene, OR) for his work on this problem.

In the April 1984 *Rupert Report,* I calculated that the C-64 BASIC has a speed of roughly 0.0002 megaflop/second. This is the number of "million (mega) FLoating-point OPerations (flop)" the computer can perform each second. One of my references gives the CDC Cyber 205 supercomputer a rating of 25 megaflop/second. Just to put this into perspective, Paul's six-day program on the 64 should take under five seconds on the Cyber 205. That's why people use supercomputers. (To put things further into perspective, what do you suppose *your* megaflop/second rating would be, even with a calculator?)

Problem #31-3: Farm Figures from Vern Leween (Brantford, ONT) brought a whole herd of solutions. With $10 cows, $3 sheep, and 50¢ pigs, the task was to buy exactly 100 head of livestock (including at least one of each) for exactly $100. The most straightforward solution is represented by this COMAL program from Sol Katz (Lakewood, CO):

```
·1 REM COMMODARES PROBLEM #31-3:
·2 REM      FARM FIGURES
·3 REM COMAL SOLUTION BY
·4 REM      SOL KATZ
·5 REM
·10 :FOR C=1 TO 98 OPEN
·11 : FOR S=1 TO 98 OPEN
·12 :  FOR P=1 TO 98 OPEN
·13 :   IF C+S+P=100 AND (C*10)+(S*3)+(P*
 .5)=100 THEN
·14 :    PRINT"PIGS, COWS, SHEEP =",P,C,S
·15 :    STOP
·16 :   ENDIF
·17 :  ENDFOR P
·18 : ENDFOR S
·19 :ENDFOR C
```

Sol and most others did some additional pre-computation figuring in order to simplify and accelerate their programs. An easy calculation shows that no more than 9 cows or 29 sheep can be bought if there is to be at least one of each animal within the $100 limit. Also, if C is the number of cows, and S is the number of sheep, then the number of pigs must be 100 − C − S. The tiny program from Keith Kushner (Brooklyn, NY) nicely implements this insight.

```
·1 REM COMMODARES PROBLEM #31-3:
·2 REM      FARM FIGURES
·3 REM SOLUTION BY
·4 REM      KEITH KUSHNER
·5 REM
·10 FORC=1TO9:FORS=1TO29:P=100-(C+S):ON-(
 C*10+S*3+P*.5=100)GOSUB20:NEXTS,C:END
·20 PRINT C;"COWS";S;"SHEEP";P;"PIGS" :RE
 TURN
```

Keith's ON/GOSUB statement in line 10 merits some discussion. It contains the logical expression (C*10 + S*3 + P*.5 = 100) which the computer interprets as either True (equal to −1) or False (equal to 0). This expression compares the cost of the animals with $100. If the cost does not equal $100, the expression is False. Negative zero is zero, and the ON/GOSUB statement falls through to the NEXT S,C statement. If the expression is True, the negative of −1 is 1, and the ON/GOSUB statement branches to the first line number following the GOSUB, namely line 20.

The advantage of using this ON/GOSUB statement is that other statements may follow it in the same program line. The alternative is to use the standard IF/THEN statement which would require an additional program line for the NEXT S,C and END statements. As a simple example, in the line

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```
10 IF A=B THEN GOSUB 50 : PRINT A
```

the PRINT statement is executed only when A=B, since the remainder of the line is skipped when the IF condition is false. If the PRINT statement is to be executed every time line 10 is reached, we must rewrite line 10 and add another line:

```
10 IF A=B THEN GOSUB 50
15 PRINT A
```

These two lines can be reduced to one as follows:

```
10 ON -(A=B) GOSUB 50 : PRINT A
```

The only disadvantage of this method is the relative obscurity of its operation. This concept can be further extended if the program should temporarily branch to one of two different places depending upon the equivalence of A and B. For example,

```
10 ON 1-(A=B) GOSUB 50,60 : PRINT A
```

Now if A does not equal B, 1−(A=B) has a value of 1, and the program branches to line 50. If A equals B, 1−(A=B) has a value of two since (A=B) is −1, and the program branches to line 60. In either case, execution returns to the PRINT A statement after the appropriate subroutine is completed.

After Paul Sobolik (Pittsburgh, PA) finished figuring that no more than 9 cows or 29 sheep could be bought, he went a step further and thought, why not do some additional pre-computing and make the program as short as possible? His result is essentially this:

```
10 PRINT "BUY 5 COWS, 1 SHEEP, AND 94 PI
GS"
```

Sure enough, his program gives the right answer!

Problem #31-4: Repeated Compression from Thomson Fung (San Diego, CA) was a fun challenge for many readers. The problem was to input a string and compress any multiple characters into single ones. For example, "ttteeeeessstt" becomes "test." You might think that such a simple problem would not allow for much creativity, but *Commodares* fans are not your ordinary thinkers.

The shortest solution is this one-liner from Keith Kushner (Brooklyn, NY):

```
·1 REM COMMODARES PROBLEM #31-4:
·2 REM   REPEATED COMPRESSION
·3 REM SOLUTION BY
·4 REM   KEITH KUSHNER
·5 REM
·10 INPUTI$:FORT=1TOLEN(I$):A$=MID$(I$,T,
 1):C$=C$+CHR$(ASC(A$)*-(B$<>A$)):B$=A$:N
 EXT:PRINTC$
```

You must use abbreviations to fit this on one C-64 line. Keith builds the string C$ by adding either the next letter or the null character CHR$(0) depending upon whether the current letter in A$ matches the previous letter which is in B$. Refer to the discussion above about logical expressions to see how the CHR$( ) value is determined. If the current letter is different from the previous letter, (B$< >A$) is true and has a value of −1, otherwise the expression has a value of 0. Since CHR$ and ASC are inverse functions, CHR$(ASC(A$)* −(−1)) equals CHR$(ASC(A$)) which is just A$, and CHR$(ASC(A$)* −(0)) is CHR$(0).

Timothy Williams (Henderson, KY) uses magic in his solution to this problem listed below.

```
·1 REM COMMODARES PROBLEM #31-4:
·2 REM   REPEATED COMPRESSION
·3 REM SOLUTION BY
·4 REM   TIMOTHY W. WILLIAMS
·5 REM
·10 INPUTA$:FORA=1TOLEN(A$):B$=MID$(A$,A,
 1):PRINTB$;:IFC$=B$THENPRINTCHR$(20);
·20 C$=B$:NEXT
```

The magic is CHR$(20), the delete character. Enter a string with many repeated characters and watch the duplicates vanish before your very eyes.

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Gary Hudach (Youngstown, OH) added some animation to his disappearing letters magic show.

```
•1 REM COMMODARES PROBLEM #31-4:
•2 REM   REPEATED COMPRESSION
•3 REM SOLUTION BY
•4 REM   GARY HUDACH
•5 REM
•10 U$=CHR$(145):INPUTA$:B$=CHR$(32)+A$:P
 RINTU$" "B$:FORT=2TOLEN(B$)
•20 IFMID$(B$,T,1)=MID$(B$,T-1,1)THENPRIN
 TU$SPC(T)CHR$(32):FORX=1TO200:NEXT
•30 IFMID$(B$,T,1)<>MID$(B$,T-1,1)THENC$=
 C$+MID$(B$,T,1)
•40 NEXT:FORA=1TOLEN(C$):PRINTU$SPC(A)MID
 $(C$,A,1)
•50 FORB=LEN(C$)TOLEN(B$):PRINTU$SPC(1+B)
 CHR$(32):NEXTB,A
```

You must not enter a string longer than one screen line for this program to work properly.

Buck Buchanan (of parts unknown) sent a BASIC solution and a functionally equivalent COMAL solution to this problem. COMAL can treat strings as arrays of single characters. Consequently some of the string operations are easier in COMAL. For example, these BASIC statements:

```
10 IF MID$(CI$,J,1)<>MID$(CI$,K,1) ...
20 CF$ = LEFT$(CF$,N-1) + MID$(CI$,J,1)
+ MID$(CF$,N+1)
```

are equivalent to these COMAL statements:

```
10 IF CI$(J)<>CI$(K) ...
20 CF$(N) = CI$(J)
```

Line 10 compares the Jth character to the Kth character in CI$. Line 20 replaces the Nth character in CF$ with the Jth character in CI$. Line 20 in BASIC 7.0 may be written as

```
20 MID$(CF$,N,1) = MID$(CI,J,1)
```

Jim Speers didn't like the idea that "SSPPPEEERRSSS" was compressed to "SPERS." His modification allows double letters to be included as long as they are separated by "/".

```
•1 REM COMMODARES PROBLEM #31-4:
•2 REM   REPEATED COMPRESSION
•3 REM SOLUTION BY
•4 REM   JIM SPEERS
•5 REM
•10 INPUT"ENTER TEXT";X$:P$=LEFT$(X$,1)
•20 FORI=2TOLEN(X$):IFMID$(X$,I,1)=MID$(X
 $,I-1,1)THEN40
•25 IFMID$(X$,I,1)="/"THEN40
•30 P$=P$+MID$(X$,I,1)
•40 NEXT I:PRINT P$
```

Line 25 of the program checks for the separation character. Now he can enter "SSPPPEEE/EEERRRRSS" and the computer responds with "SPEERS." Without running this program, can you predict the result of having several consecutive /'s?

Thanks and congratulations this month to the following people not already mentioned who wrote with challenges and solutions:

Tim Bauer (Sapulpa, OK)
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Special thanks to Pol Magermans who sent *Commodares* solutions all the way from Verviers, Belgium. □

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PROMAL: A Look at a Programmer's Language

By Cheryl Peterson

So far in this three-part series, we've compared Commodore BASIC, Pascal, and COMAL. We've seen that Pascal is very structured, while COMAL and BASIC can be structured but don't have to be. In this final installment, we take a look at another structured language. It is, in fact, as rigid as Pascal.

PROMAL (PROgrammer's Micro Application Langauge) was designed for programmers who want to sell their end product. It comes in two versions: one for commercial developers and one for those who plan to use their programs only for themselves. There is no royalty or fee charged for selling programs you write using the developer's system.

PROMAL programs must be compiled before they are run. A deficit of using a compiler-based program is having to recompile during the debugging process. If you have errors in your program, you have to reload the program into the editor, make any changes, leave the editor, and then recompile. This process must be repeated until all the mistakes are found. In some cases, even if the compiled program runs, errors can still occur. Finding these runtime errors is even more difficult than finding compile errors.

Knowing that the language is a bit more difficult to use than a non-compiled language, why would anyone choose it? Because the compiled programs run much faster than those written in interpreted languages like BASIC and COMAL. They also occupy less disk space. The end user does not need a copy of PROMAL to run the programs. And once the program is compiled, it is difficult for the end user to examine or modify the program, making it ideal for commercial programs.

PROMAL includes an editor and what is called the executive. The editor is used to type in your programs. The executive handles disk functions, other I/O (input/ output) operations, and compiling. With the commands included on the function keys, both of these are fairly easy to use.

GETTING DOWN TO PROGRAMMING

PROMAL programs are structured similarly to Pascal programs. Each program must start with a program name and variables must be declared before being used. Procedures and functions are defined at the beginning. As with Pascal, PROMAL procedures and functions are called by name from within the body of the program.

PROMAL contains many of the same statements and commands as Pascal, but there are some major differences (see accompanying list of reserved words). One of these is the handling of I/O routines. In the language itself, there is no PRINT or its equivalent. Instead, several routines found in a library on the disk control this type of activity. Designed as procedures and functions, the library contains routines corresponding to the more complicated Pascal or BASIC commands. Because of this, one of the first lines in many programs will be INCLUDE LIBRARY. Our sample program will demonstrate the use of a couple of these library procedures.

Another major difference is the handling of strings. You can use literal strings to output text messages to the screen, but there is no variable type designed to handle strings. Instead, you must designate an array of type BYTE to hold any strings you wish to manipulate within the program. Although the data type WORD would seem appropriate to hold string variables, PROMAL defines WORDs as unsigned integer numbers between 0 and 65,535. This does give a little more flexibility than many other Commodore languages that have trouble handling integers over 32,767. However, it doesn't help with string manipulation.

SYNTAX DIFFERENCES

In PROMAL you are limited to one statement per line.

PROMAL RESERVED WORDS

Commands

AND	CHOOSE	FUNC	OR	TO
ARG	DATA	IF	OWN	TRUE
ASM	END	INCLUDE	PROC	UNTIL
AT	ELSE	INT	PROGRAM	WHILE
BYTE	ESCAPE	LIST	REAL	WORD
BEGIN	EXT	NEXT	REFUGE	XOR
BREAK	FALSE	NOT	REPEAT	
CON	FOR	NOTHING	RETURN	

Data Types		**Other Names**		
BYTE	INTEGER	CONSTANT	DATA	PROCEDURE
WORD	REAL	VARIABLE	FUNCTION	PROGRAM

PROMAL SELF-ADDRESSED LABELS

```
PROGRAM LABELS

INCLUDE LIBRARY

WORD LINES
WORD PASSES
WORD X
WORD Y
WORD P
WORD R
BYTE NAME[21]
BYTE ADDRESS[41]
BYTE CITY[21]
BYTE ST[3]
BYTE ZIP[10]
BYTE BUF[81]
BYTE INDEX
BYTE W

PROC LABELFORMAT
BEGIN
PUT "How many lines per label?",CR
GETL BUF
INDEX = STRVAL(BUF,#LINES)
END

PROC PRINTNUMBER
BEGIN
PUT "How many labels to print?",CR
GETL BUF
INDEX = STRVAL(BUF,#PASSES)
END

PROC READDATA
BEGIN
PUT "Enter full name--20 characters or less.",CR
GETL NAME,20
PUT "Enter address--40 characters or less.",CR
GETL ADDRESS,40
PUT "Enter city--20 characters or less.",CR
GETL CITY,20
PUT "Enter 2 character state code.",CR
GETL ST,2
PUT "Enter zip code--9 characters or less.",CR
GETL ZIP,9
END

PROC PRINT
BEGIN
R = OPEN("P",'W')
FOR X = 1 TO PASSES
  OUTPUTF R, "#S#C", NAME
  OUTPUTF R, "#S#C", ADDRESS
  OUTPUTF R, "#S ", CITY
  OUTPUTF R, "#S ", ST
  OUTPUTF R, "#S ", ZIP
  FOR Y = 1 TO LINES
    PUTF R, CR
CLOSE R
END

BEGIN

LINES = 0
PASSES = 0

LABELFORMAT
PRINTNUMBER
READDATA
LINES=LINES-3
X = 1
Y = 1
PRINT
END
```

There is no punctuation needed at the end of lines. A semicolon is used to designate a remark. In a line containing a semicolon, everything after the semicolon is ignored.

PROMAL's variables and other identifiers can have up to 31 characters, all of them significant, unlike BASIC which only looks at the first two characters. Although PROMAL's reserved words cannot be used as variables, they can be used within variables. For instance, TON is a legal variable even though it contains the reserved word TO. When compiled, these variables use no more memory than short variables, so highly descriptive variables aren't a liability.

Procedures and functions start with a name, followed by a BEGIN and then any local variables or definitions. Any looping segments are indented. Looping commands include IF/THEN, FOR, REPEAT/UNTIL, WHILE, and CHOOSE. The CHOOSE statement is similar to Pascal's CASE. Functions and procedures end with an END statement.

UNIQUE COMMANDS

PROMAL has two unique statements available. ESCAPE allows you to jump out of a procedure or function if a problem is detected or you need to exit early. REFUGE is the place to which the program jumps. You are allowed up to three refuge locations. This is the closest to a GOTO that you will find in PROMAL.

OUR SAMPLE PROGRAM

In order to stay consistent with the other segments of the series, we'll once again create our self-addressed labels program, this time using PROMAL (refer to listing at left). As in past installments, we'll use our four subroutines: labelformat, printnumber, readdata, and print. Since PRINT is not a reserved word in PROMAL, we are free to use it as a procedure name.

We start with the program name and then use the INCLUDE LIBRARY command, because we will need the library procedures for I/O. Next we have a *lot* of variables to declare.

You'll remember that WORDs are integers from 0 to 65,535. By defining some variables as WORDs, we prevent the use of negative numbers. LINES is used to hold the number of lines per label. PASSES holds the number of labels to print. X, Y, P, and R are used in the print procedure.

Since strings must be contained in arrays, we define NAME, ADDRESS, CITY, ST, ZIP, and BUF as being of type BYTE and follow each with the number of characters to be held. BUF is a temporary storage area, which we'll detail when we get to the procedures that use it. INDEX is used in conjunction with BUF.

There's a little idiosyncracy of PROMAL that you should know. In the declaration of the length of the array you must add one extra space for an end of array marker. This means that instead of declaring an array with two spaces for our state code, we must use three. You would not believe the headache that will result if you forget this. So remember it if you intend to use PROMAL at all.

The labelformat procedure uses the PUT procedure (found in the library that we included earlier) to print our prompt on the screen. GETL is short for "get line," and this we use to get the number of lines per label. GETL works similarly to INPUT in BASIC. One of the peculiarities of

PROMAL is that getting numbers (as opposed to letters) requires an extra step.

The input must be buffered and then converted to a number value using the STRVAL function (also found in the library routine). This function is a bit difficult to understand. If you remember the Pascal column, I mentioned that you "evaluate a function and execute a procedure." We would expect STRVAL to return the numeric value of the buffered characters. Instead, it returns the memory location where the value is stored. This adds an extra variable to our function.

INDEX is the variable (must be a BYTE variable) that points to where the value of LINES is stored. The function does store the value that we need in the variable LINES, so we can use that value later. It just goes about it a little strangely.

The printnumber routine uses the same function to obtain the PASSES value.

The readdata procedure uses the PUT and GETL procedures to obtain our values for NAME, ADDRESS, CITY, ST, and ZIP. While we defined our variables at the beginning and set the number of characters for our arrays, we must follow the variable name in each GETL statement with a comma followed by the number of characters of input to accept. This limits the input to prevent us from overrunning the variable's capacity.

The print procedure is a bit complicated. The R variable is used to designate a path for information flow. In this case, we open a channel to the printer ("P") in write access ('W') mode. We then use our two FOR loops to output each label's information the required number of times. Lastly, the procedure closes the channel to the printer.

There are two commands that can be used to send the information to the printer: OUTPUTF and PUTF. OUTPUTF allows a little more flexibility as to how the information is printed out. In the OUTPUTF statements you'll notice the #S and #C designators. These identify how the information is to be printed. #S stands for "print as a string of characters." #C stands for "print a carriage return." There are other designators for printing as a signed real number, an unsigned real number, or an unsigned integer value.

Unlike BASIC, PROMAL does not automatically end each printed line with a carriage return. Instead, these are added individually as needed. Notice the ,CR at the end of our prompt lines in the readdata procedure, for instance. In our OUTPUTF statements we must also add the carriage returns.

That covers the procedures used. The main body of the program sets the LINES and PASSES variables equal to 0. It calls the labelformat, printnumber, and readdata procedures. Before it can print the labels, we need to reduce the number of lines per label by three. As you recall, we use the variable LINES to determine the number of carriage returns we must place after our data to take us to the top of the next label.

In PROMAL, until you set a variable it contains a "garbage" value. So we must set X and Y equal to one before we execute our print procedure. This could have been done just below where we set LINES and PASSES equal to zero, but I was feeling lazy. That leaves only executing the print procedure, and the program's done.

NEXT MONTH

With next month's column heralding the approach of Christmas, I'd like to take a look at some nice presents you might want to buy for your computer. After all, you'll be buying presents for all your friends and relatives. While I've had my computers long enough to think of most of them as relatives, even those of you have only had yours a short while should have gotten a friendship started by now.

If there are any comments you'd like to make about the *Cadet's Column* or any criticisms you'd like to voice, send a letter via *Ahoy!* or stop in the two rooms where I hang out on PlayNET. The *For Starters* room is intended to help those who are just starting to use their computers, although we'll gladly answer any questions that come up. It's currently open on Sunday nights. My room, *Cherp's Library,* is open on Friday and Tuesday nights. If you need help finding articles or books on any particular topic, stop in and I'll check my collection and see what I can recommend. And don't forget the *Ahoy! Port of Call* on Saturday (moved from Thursday) nights. □

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The COMSTAR Aero 160 gives you a 10" carriage, 150-170 CPS, 9 x 9 dot matrix with double strike capability for 18 x 18 dot matrix (near letter quality), high resolution bit image (120 x 144 dot matrix), underlining, back spacing, left and right margin setting, true lower decenders with super and subscripts, prints standard, block graphics and special characters. It gives you print quality and features found on printers costing twice as much!! (Centronics Parallel Interface) List $499.00 **Sale $199.00.**

9" SAMSUNG GREEN SCREEN MONITOR

Super High Resolution composite green screen monitor. Perfect for 80 column use with The C128 computer (Req. $19.95 Cable)
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This POCKET WRITER 64 WORD PROCESSOR is the finest available for the COMMODORE 64 computer! The ULTIMATE FOR PROFESSIONAL Word Processing, DISPLAYS 40 or 80 COLUMNS IN COLOR or black and white! Simple to operate, powerful text editing, complete cursor and insert/delete key controls line and paragraph insertion, automatic deletion, centering, margin settings and output to all printers! List $59.95. **SALE $39.95.** ***Ltd. Qty***

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(Examples)

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C128 COMPUTER $299.00

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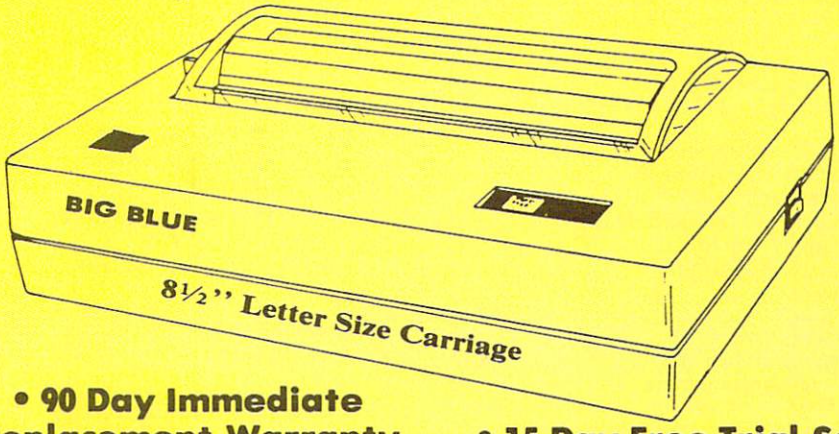

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This printer was made by **Canon®** for one of the largest computer manufacturers in the world. The Big Blue printer comes ready to hook up to the serial port of the **IBM®PC jr.** Plus with low cost adapter cables you can connect the Big Blue printer to the **IBM®PC, IBM®XT, IBM®AT, IBM Compatibles , Apple®II,IIe,IIc, Apple Compatibles, Commodore®** 64,128, **Atari®**, plus many more.
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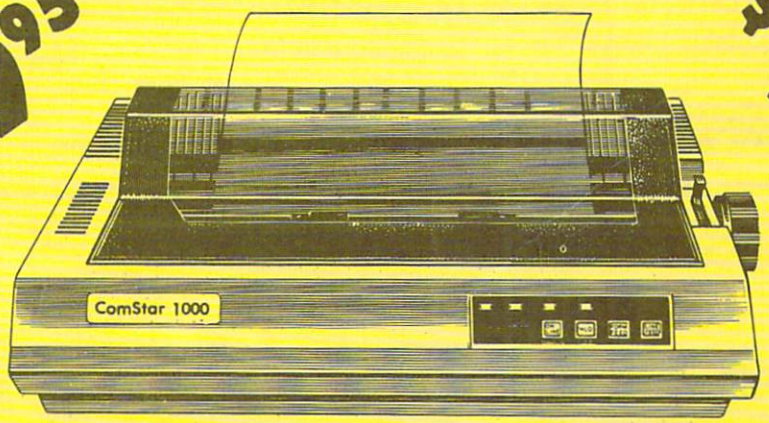

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Serial impact dot matrix (9 pin)

Print Speed
Draft- 100 CPS NLQ- 20 CPS

Character Sets
96 ASCII Characters, Marker, Symbols (includes italic font)

Ribbon (Life exp.)
Black: cassette (2.5 million characters)

Dimensions
15.4 (W) x 10.9 (D) x 4.7 (H) inch

Weight
Approx. 10 lbs

Character Spacing
Fixed

Line Spacing
1/6, 1/8, 7/72, and 1/216 inch

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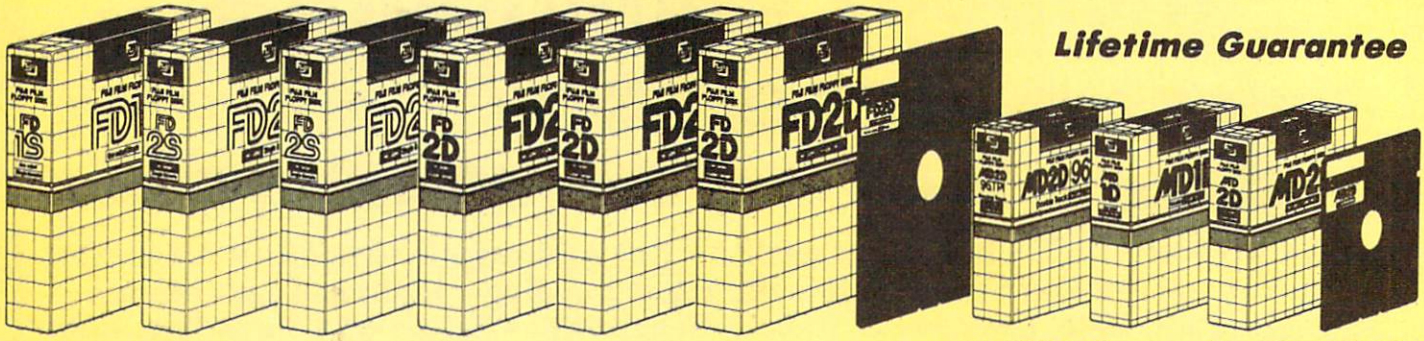

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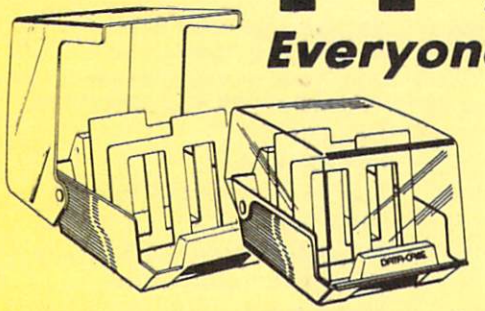

Everyone Needs a Floppy Disk Secretary

Facts:

- Dust and Dirt particles can hurt your disks
- Most disks go bad due to mishandling in storage
- Proper filing of your disk collection will reduce unnecessary handling of your disks

The Floppy Disk Filer is an inexpensive hard plastic Fliptop case that will allow for easy filing, and protect your disks from dust, smoke, and dirt. Plus, the Floppy Disk Filer will keep all your disks out of unwanted hands and in one place where you can easily find them. **(Holds Over 50 Disks)**

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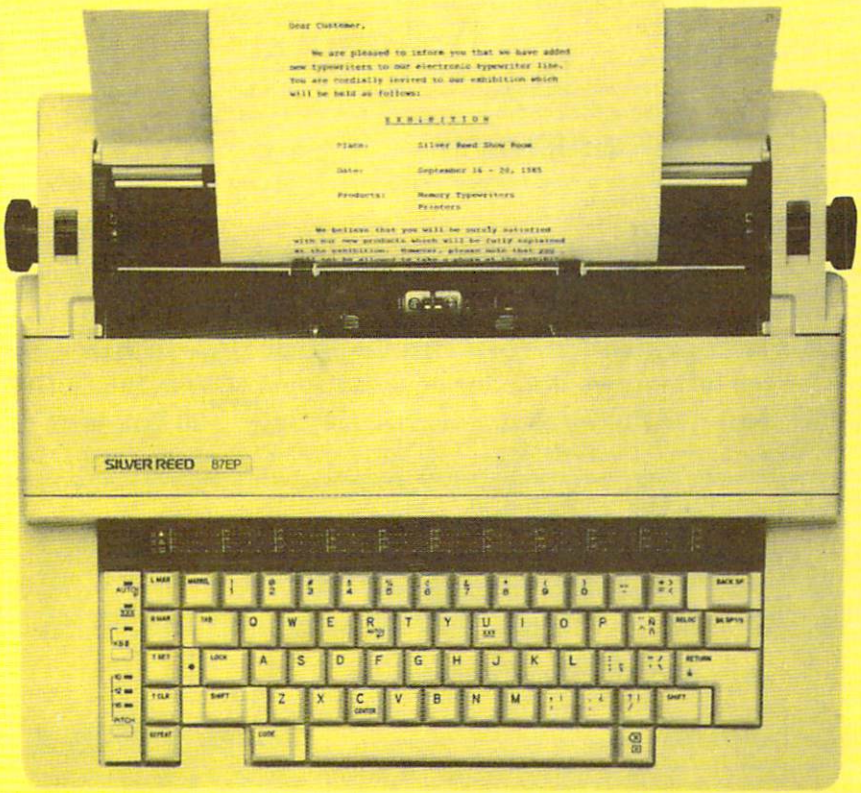

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Print pitch	10,12, and 15

Keyboard:	
Keys/characters	44/96
Automatic carrier return	
Automatic correction	25 ch.
Automatic underline	
Relocate key	
Tabulation	
½ back space key	

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We are so sure of C-128 Disks that we give you a free replacement warranty against failure to perform due to faulty materials or workmanship for as long as you own your C-128 disk.

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Just like a record needle, disk drive heads must travel hundreds of miles over disk surfaces. Unlike other floppy disks the C-128 smooth surface finish saves disk drive head wear during the life of the disk. (A rough surface will grind your disk drive head like sandpaper). The lint free automatic CLEANING LINER makes sure the disk-killers (dust & dirt) are being constantly cleaned while the disk is being operated.

C-128 Disks are definitely the Cadillac disk in the world

Just to prove it even further, we are offering these super LOW INTRODUCTORY PRICES

1 Box of 10 — $5.90 (59¢ ea.) 5 Boxes of 10 — $29.50 (59¢ ea.) 10 Boxes of 10 — $59.00 (59¢ ea.)

0029 Paper Economy Sleeves (10) 50¢ 0030 Paper Economy Sleeves (100) $5.00

☆ ☆ COMMODORE 64 ☆ ☆

PARTY QUIZ ONLY $14.95

Trivia Controller & Software

Discover a better way to learn while you play, at a new, low price. Learning and entertainment are probably the reasons you bought a home computer. We've created a new, unique hardware/software system, like nothing ever produced for home computers, that satisfies those two motivations. It's called PQ, The Party Quiz Game. Included in each package are four special controllers (one for each player), a program disk and General Edition 1 disk containing 2700 questions covering a variety of subjects. PQ's Question / Answer Library (6 optional packages) expands the total number of questions to over 18,000. PQ asks the players a question; all are allowed to respond at once. Points are awarded for correct answers which are displayed on screen after a time elapses. All age and education levels, from reading age on up, can play thanks to PQ's "handicap" feature. Find out for yourself why Party Quiz gets 4 star ratings. List $49.95. **Sale $14.95.**

PQ's four exclusive Quick Response™ controllers free players from keyboard captivity.

Additional Trivia Software Modules

	List	Sale
General Edition 2,3 (specify)	$39.95	**$12.95**
Sports Edition	$39.95	**$12.95**
Education Edition	$39.95	**$12.95**
Bible Edition	$39.95	**$12.95**
Entertainment Edition	$39.95	**$12.95**

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Home Control

Protect Your Home ***Save On Utilities*** ***Regulate Appliances and More!!***

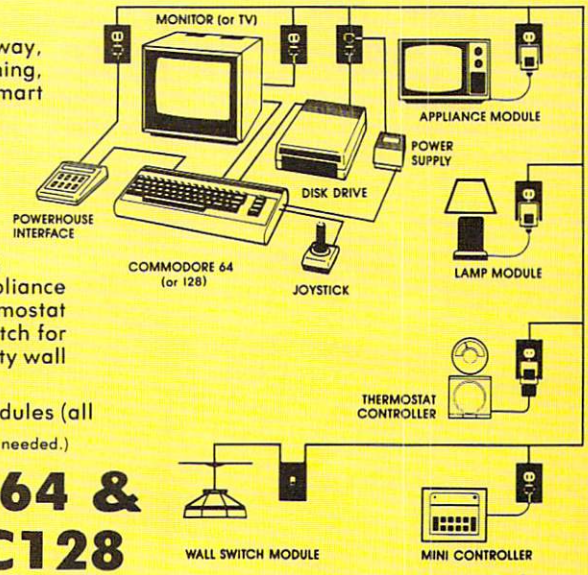
Controls Lights, Appliances, Thermostats, and More Throughout Your Home for Added Convenience, Security, Safety, and Energy Savings. Without Tying Up Your Computer

$49.95 **$49.95**

Free Lamp Module ($19.95 value) with purchase of X-10 computer interface.

The X-10 POWERHOUSE Computer Interface is programmed from your Commodore 64 or 128. You can then turn off your computer or use it for something else. It does not tie up your computer. The software shows a graphical representation of your home and allows you to select a room, then select a light or appliance to be controlled, all just by pointing with the joystick. The interface sends digital signals over your existing house wiring to control your lights and appliances which are connected to plug-in modules (sold separately) List $99.95. **Sale $49.95.**

It can wake you up to stereo or TV news. Light up your bedroom, hallway, bathroom. Start the coffee, start your central heating or air conditioning, warm up the curlers, all before you even get out of bed. But it's smart enough not to wake you up on weekends. At night it can lower the heat, play music or your favorite late night TV show for as long as you want, and can first dim and later turn out the lights automatically.



Many types of modules are available including appliance modules for TV's, hi fi's, coffee pots, etc. Lamp modules which contain a dimmer and can be used for incandescent lamps up to 300 watts. Wall switch modules which also contain a dimmer and can be used for incandescent outside lights and ceiling lights of up to 500 watts. 220V heavy duty appliance modules for 220V air conditioners and water heaters. The thermostat controller for central heating and air conditioning. The 3 way wall switch for controlling incandescent lights operated by two switches. The heavy duty wall receptable module to replace your existing wall receptable, etc.

Plus, works with BSR, GE, Leviton, Radio Shack, and Sears Roebuck modules (all 256 codes addressable). (Price does not include modules, please order modules as needed.)

Control Modules

	List	Sale
Lamp Module — 300 W incandescent	$19.95	**$14.95**
Wall Receptacle — replacement outlets	$24.95	**$19.95**
Wall Switch — turn on/off dim/brighten	$19.95	**$14.95**
3 Way Wall Switch — incandescent lights, for lights controlled by 2 or more wall switches.	$24.95	**$19.95**
Thermostat Controller — controls your existing thermostat	$39.95	**$29.95**

C64 & C128

	List	Sale
2 Pin Appliance Module, up to 500W appliances	$19.95	**$14.95**
3 Pin Appliance Module, up to 500W appliances	$19.95	**$14.95**

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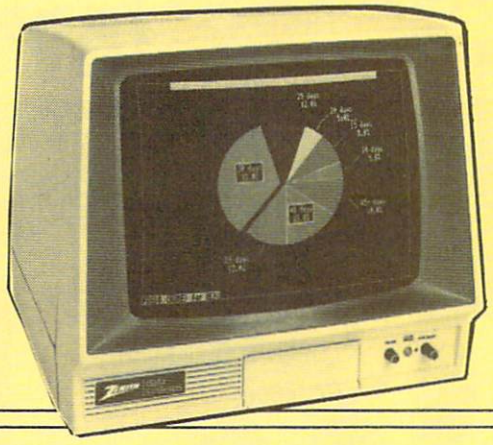

TV/MONITOR SCREEN RESTORER & CLEANING KIT

Sale $9.95

Reduce eye fatigue by increasing the clarity of your TV or monitor screen. This kit contains a hard wax formulation to cover surface imperfections on TV screens and monitors. This restores maximum optical clarity, making what you see more distinct. Plus high absorbency cloths and an auto static spray cleaner allows you to clean your screen on a regular basis to keep your screen looking better than new. (This is a must for those who watch monitors or TVs for extended lengths of time.) List $19.95. **Sale $9.95.**

DISK DRIVE CLEANER

Reg. $19.95.
Sale $9.95

- 60% of all drive downtime is directly related to poorly maintained drives.
- Drives should be cleaned each week regardless of use.
- Drives are sensitive to smoke, dust & all micro patricles.
- Systematic operator performed maintenance is the best way of ensuring error free use of your computer system.

This unique twin slot jacket design gives twice as many "wet-dry" cleanings per rotation as other leading brands. Non abrasive, 100% lint free, random fiber cleaners capture dust, smoke particles and disk oxide build up which insures you against disk and data loss from dirty disk drive heads just like you must clean your albums and tape players you must clean your disk drive heads to keep your disk drive working well. (24 cleanings per kit.) List $19.95. **Sale $9.95.**

ANTI-STATIC KEYBOARD CLEANER

Sale $9.95

Now you can clean your computer keyboard fast, efficiently, and safely. The keyboard cleaning solution is exclusively formulated to remove skin oils, dust, and dirt that can destroy your equipment. Plus this non residue solution with anto-static properties will not build up like ordinary household cleaners so you can clean as much as you like without worry. Plus the lint free, high absorbency, non-abrasive cloths will not scratch or mar your equipment as they pick up dirt and grime in a matter of seconds. List $19.95. **Sale $9.95.**

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Sale

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- For Small Business Computers
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- One Year Warranty'

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- High Resolution
- Sharp Clear Text
- Anti-Glare Screen
- 40 Columns x 24 Lines
- Front Panel Controls

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Add $14.50 Shipping

80 Columns **RGB** Super High Resolution

13" Color Computer Monitor'

*C64/Atari composite cable $9.95

* C128 RGB/Composite 80 column cable $19.95.

14" RGB & Composite Color Monitor

Allows use of C-128 and C64 mode - composite and 80 column RGB mode. Must be used to get 80 columns in color with 80 column computers. Specially designed for use with the C128's special composite video output, plus green screen only option switch. (add $14.50 shipping)

List $399.00 Sale $239.95*

12" 80 Column Green/Amber Monitor

Super high resolution composite green or amber screen monitor. 80 columns x 24 lines, easy to read. Fantastic value. Limited Quantities.

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9" Samsung Hi Res Green Screen Monitor

Super High Resolution 80 column monitor perfect for Apple & Laser 3000/128 computers. Fantastic Value. Very Limited Quantities.

List $129.95 Sale $59.95*

Turn Your Monitor into a TV Set Without Moving Your Computer

Elegant TV Tuner with dual UHF/VHF selector switches goes between your computer and monitor. Includes mute, automatic fine tuning and computer-TV selector switches. Inputs included for 300 ohm, 75 ohm, and UHF. Can be used with cable TV and VCR's. Fantastic Value. Limited Quantities. (Includes loop antenna for UHF & RCA connecting cables) (Add $3.00 Shipping. Plus $3.00 for APO/FPO).

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15 Day Free Trial - 90 Day Immediate Replacement Warranty

• LOWEST PRICES • BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

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Rated No. 1 in Computer Education

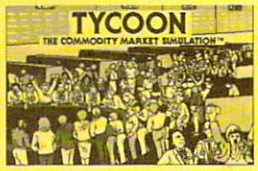
DesignWare

Commodore 64 SALE

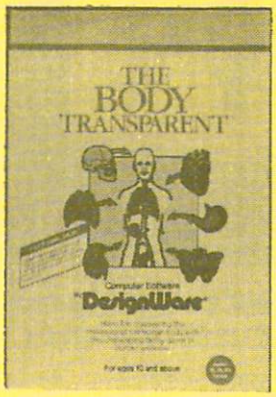
Blue Chip

European Nations and Locations — An exploration of the continent that combines important facts and information in a challenging game format. The only European geography program that allows you to add questions of your own. If you miss a question during game play it is recycled to guarantee learning. Each game, you move nations to the proper location on a map of Europe. The map fills in with color as questions are correctly answered. Fast answers are rewarded with bonus points. Winner of the Parents Choice Award. (Disk)
List $44.95 **SALE $26.95**

Tycoon — It takes an individual with loads of confidence and driving ambition, to deal in the commodities marketplace. To foresee market trends and develop a plan of action before trading, are talents that can make or break you as you deal in precious metals, oil, grains and other items of necessity. Armed with charts and details from real-life situations of the past, you can research the market and make your move accordingly. The element of risk makes the game play a real challenge for all aspiring tycoons, or even established entrepreneurs. (Disk)
List $29.95 **SALE$16.95**



The Body Transparent — Learn basic anatomy as you play a game of facts and functions of the human body. Choose a male or female body and move bones and organs to their location. Then learn what the body parts perform. Find out where food is digested, the importance of kidneys and much much more. Add your own biology questions to help make homework fun or to challenge a friend. The game has multiple difficulty levels and bonus points for fast answers, plus color graphics. (Disk)
List $44.95 **SALE $26.95**



Baron — If you were given the opportunity to invest in real estate with a complimentary sum of money, say $35,000 and a time limit of 52 game -weeks to turn that into a million, how would you proceed? Baron is a program that offers you the chance to find out what your chances of success in this complicated venture will be. You must utilize the allocated funds wisely in buying, selling and developing land because real life influences like flunctuating mortage rates and other headaches that affect property owners will be apparent during play. It's challenging and risky to win the title of Baron (Disk)
List $29.95 **SALE $16.95**

States & Traits — A valuable learning tool for geography and history students. Learn basic geography and then go on to find out interesting facts about every region in the country. Find out where historical events happened on the map. As you play quick answers are rewardedwith bonus points. In the "States" part of the program you must move states into the right place on the map and the state lights up in bright color. In "Traits" you identify state capitals and landmarks. You can also design your own games (Disk)
List $44.95 **SALE $26.95**

Millionaire — Put yourself in high gear and join the risk takers, because you are about to experience the New York Stock Exchange. To get you started in investments you are given $10,000 and 154 stocks from 5 industry categories, the rest is up to you. Learn the market as you are faced with influences based on true to life events, good judgement is essential to whether you buy or sell and the status of your personal portfolio depends on making the right choices. The play includes and introduction to buying-on-margin, call options, put options and borrowing against your net worth. (Disk)
List $29.95 **SALE $16.95**

EduWare

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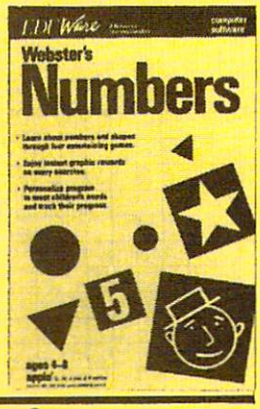
Algebra I,2, or 3 — An introduction to Algebra concepts and definitions. Helps students master the fundamentals of first year Algebra, addition of real numbers, multiplication of real numbers, solving equations, solving inequalities and absolute value sets. Students can learn in 4 ways: They can work the sample problems, read discussions of concepts, watch equations being solved, or study rules that govern mathematic operations. The result is that the student creates a learning process that he or she is most comfortable with. (Disk)
List $39.95 **SALE $19.95**

Webster's Numbers — Introduce your young children to basic arithmetic concepts with this program that combines lively animation with four action games. For children with minimal reading skills, they will learn shape discrimination, eye-hand coordination, number recognition and sequential counting to name just a few. Children will delight in maneuvering a hot air balloon, leading a mosquito to safety and pushing blocks and triangles into different shapes. (Disk)
List $39.95 **SALE $19.95**

Commodore 64 SALE



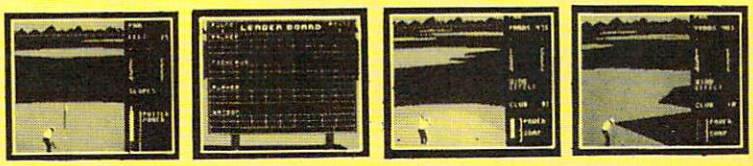
☆ ☆ Britannica Learning Companies ☆ ☆

C64 **Super Sale!! Save On** C128

Access Software

Best Multi Level Graphics Games in the U.S.A.

No. 1 Golf Game



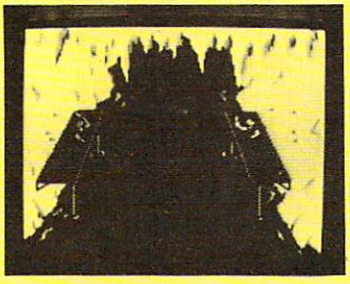
Leader Board — This is not just another golf program, it is the most realistic one on the market because it is really a simulator that allows true perspective of the game. Three levels of play take you from beginner to pro. The courses are difficult and require concentration to come in under par. (Disk) List $39.95. **Sale $23.95.** *Coupon $22.95.*

Disk No. 1 — Courses for Leader Board. Four different golf courses are on this disk of varying degrees of difficulty. List $19.95. **Sale $13.95.**

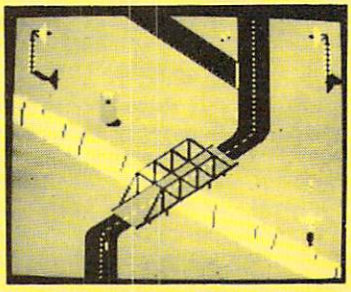
Disk Drive Speeder-Uppers

Mach 5 — Plug Mach 5 into the cartridge port and turn on the computer, the cartridge works automatically to load programs up to 5 times faster than normal. Loads 99% of all software, even copy protected games. Works with all popular printers. Will list directories without disturbing programs in memory. Commands such as LOAD, SAVE, OPEN etc. are executed with one keystroke. More features than most other "fast loaders". Does not disturb RAM. (Cart.) List $34.95. **Sale $19.95.**

Mach 128 — This "fast loader" will load programs up to 500% faster on the 1541 disk drive or the 1571 drive in 1541 mode, plus it has features that make it one of the best on the market. A full help menu, screen dump, 95% compatibility, 10 second formatting, plus much, much more. (Disk) List $49.95. **Sale $28.95.**

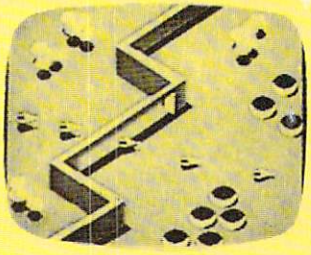


Beachhead II — Fantastic hi-res scrolling screens will lead you to new levels of excitement. Three scenarios, each with fantastic scrolling screens, add great realism to the game. First you maneuver your helicopter past tanks and artillery to the fortress wall. Then you must time your moves quickly as you go through the opening and closing gates. Scene 2 starts after you drop your paratroopers and make your way to the dictators machine gun emplacement. You must attack the dictator and rescue his hostages. Finally in Scene 3 you have the final confrontation plus you can be the rescuer or the dictator and play against an opponent or the computer. Fantastic two player Head to Head action. Highly recommended. (Disk) List $49.95. **Sale $22.95**



Beach Head — Multi Screen computer graphics at its finest. First you must maneuver your fleet through the mine laden channel while torpedoes are fired at you from all sides. Next you must engage the enemy planes with your anti-aircraft guns (best scenario graphics anywhere). Then you must sink the enemy fleet before they sink you. Next you maneuver to the beach head where your tanks must get through an obstacle course and finally fight the ultimate battle at Headquarters. All scenes in stunning 3-D graphics. List $39.95. **Sale $17.95.** (Disk or Tape.)

Raid over Moscow — The ultimate in multi screen computer graphics has arrived. (over six screens) The Soviets have launched an attack. First you must locate and destroy the ICBM missiles from your Stealth Bomber, then you must lead your squadron through the Soviet terrain to the Kremlin itself. Destroy the defenses, then destroy the defense center and finally the attack operations themselves. Fly planes, launch grenades, shoot bazookas. Super Fantastic Graphics, Sound, Animation. List $39.95. **Sale $22.95.** (Disk.)



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Fast Load Cartridge — Load, save and copy disks five times faster than normal. It plugs into the cartridge port ot the Commodore 64 and goes to work automatically loading disks with ease. And that's only the beginning. It can copy a single file, copy the whole disk, send disk commands, and even list directories without erasing programs stored in memory. (Cartridge). List $39.95. **Sale $22.95.**

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Commodore 64

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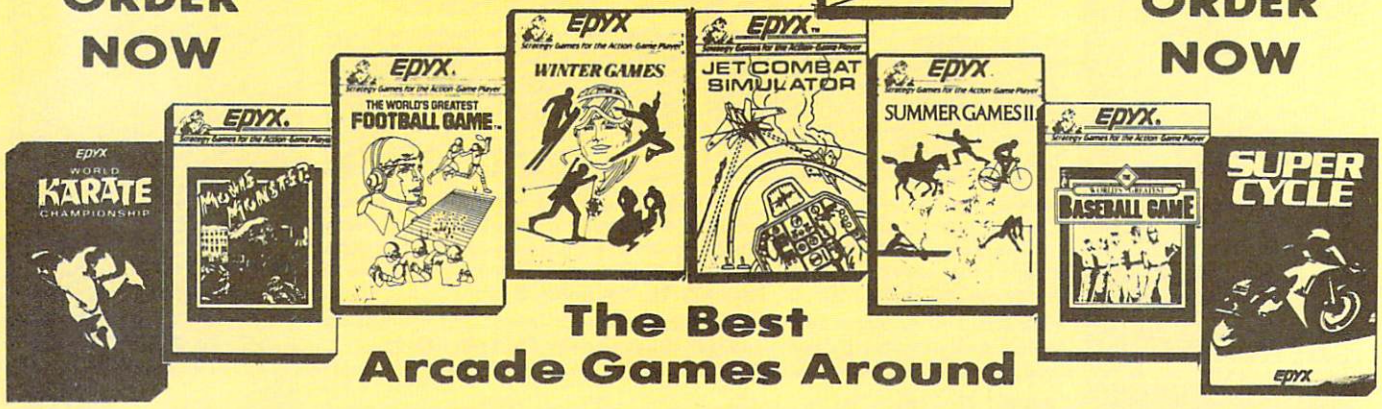

The Best Arcade Games Around

World Karate Championship — Become a Karate master! You must prove your ability as you earn your belts. Travel to four different cities to fight a series of opponents. There are 14 controllable moves, including kicks, blocks and front flips. The opponents become progressively tougher as skills improve. Start as a "white belt" in this exciting martial arts challenge. The character on-screen is realistic right down to facial expressions. Excellent graphics and background music. (Disk) List $34.95. **Sale $18.95.** *Coupon $17.95.*

Super Cycle — Experience the excitement and danger of motorcycle racing. Lean into the turns and cruise through the scenic Grand Canyon or the Rocky Mountains, as you race cross country. Measure your speed with your tachometer and speedometer. All the instruments are realistic. Features eight different courses, day and night racing and obstacles to challenge the driver, like road barricades, oil slicks and ice. The competition is stimulating and the graphics are first rate. (Disk) List $39.95. **Sale $23.95.**

The World's Greatest Football Game — This one has it all — strategy, action, three views of the field. It's in a class all its own! Finally, a football game that not only puts you on the field, but also on the sidelines in the coach's shoes. Use the "Playbook" or design your own offensive and defensive plays. Then, grab the joystick and put your strategy to the test. You control key players to run a sweep, make a tackle, throw a pass and even kick a fieldgoal. All the action and all the strategy make this your favorite football game. (Disk) List $39.95. **Sale $22.95.**

Winter Games — Experience the challenge of six winter sporting events. In the Bobsled, you're right in the tube careening along the walls. At the SkiJump, you control your form in take-off, flight and landing. In Figure Skating, timing counts for the transitions, the jumps and landings. Choreograph your own routine in Free Style Skating. Hot Dog Aerials push your agility to new heights. The Biathlon challenges your endurance in cross-country skiing. There's even an opening ceremony, complete with national anthems. One to Eight Players.
(Disk) List $39.95. **Sale $23.95.**

Jet Combat Flight Simulator — Flight simulation programs are the most requested in the country. The key to a good one is realism, the sensation of being in the cockpit — guiding the plane through take-offs, landings and air to air — air to ground combat. You are an Air Force pilot and your mission is critical. Your success in completing your orders depends on how quickly and accurately you react. Very intense — Fantastic Graphics, animation and control elements. (Disk) List $39.95. **Sale $18.95.**

Summer Games II — The original Summer Games was last Summer's No. 1 seller. Carry on the tradition with another chance to "Go for the Gold!" Introducing Summer Games II with 8 new Olympic events including Kayaking, cycling, fencing, diving, track & field, gymnastics and equastrian. The excitement of Olympic competion is present in this new version as it was in the original. Great graphics and sound effects. This one's a winner! (1 to 8 players). (Disk)
List $39.95. **Sale $20.95.**

Movie Monster — Remember all those Saturday afternoons in front of the TV, with a big bowl of popcorn and an old Japanese monster movie? If you do then Epyx has created a program that will soon become a favorite in your software library. You choose the monster and control the outcome of the movie. The movies of the past always ended with the destruction of the monster but you can turn the tables by placing your creation in the hero role. Develop exciting plots for hours of fun. (Disk) List $39.95. **Sale $23.95.**

The New World's Greatest Baseball Game — One of the season's hottest offerings is this new enhanced baseball program. Fans can take over managing their favorite team, or create an All-Star team with players from the past or present. Two double sided disks are filled with teams, players and their stats. The graphics are improved and the team roster is the most complete that is currently available. A scoreboard will challenge your knowledge of baseball trivia. Two game modes allow you to play and manage or just manage. Fantastic. (Disk) List $34.95. **Sale $18.95.**

Super Graphics

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Weekly Reader

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☆ ☆ Educational Programs ☆ ☆

Stickybear Typing — Stickybear makes learning the keyboard both easy & fun for anyone. A 3 game format provides different levels so that as typing skills improve so does the level of difficulty. ***Stickybear Keypress*** is geared to the needs of the child or the beginner, the stress is on the keyboard. To increase typing speed and accuracy the fast-paced ***Stickybear Thump*** will provide a real challenge. ***Stickybear Stories*** allows further practice with real text for timed practice. Everything from jokes, stories and bright amusing graphics make this one of the most delightful typing programs ever, plus you can keep track of your progress and store on disk. (Disk) List $29.95. **Sale $14.95.**

C64 SALE

C64 SALE

Stickybear Spellgrabber — 3 games in one: Picture Spell contains over 200 word/picture combinations. Word Spell is a scramble game, players recreate words shown on the screen. Bear Dunk involves guessing a word to save Stickybear from a dunking. (Disk) List $29.95. **Sale $14.95.**

Stickybear Math — Kids learn math skills as they help the Stickybear Family out of sticky jams. For every set of addition and subtraction problems youngsters get right, Stickybear gets a step closer to getting out of the jam. (Disk) List $29.95. **Sale $14.95.**

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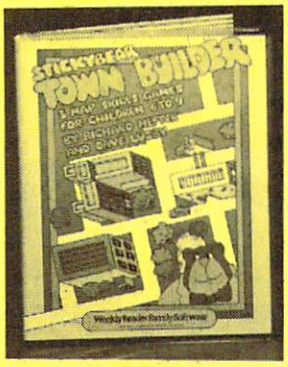

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3 fun activities that build reading comprehension skills. Match The Words: Kids practice vocabulary as they match up word and picture sets. Find The Word: Turns the words in a sentence into animated action. Build A Sentence: Children choose a subject, a verb and an object, then watch them turn into a picture. (Disk)
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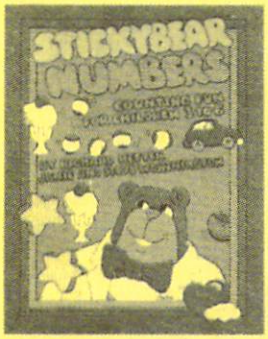

Stickybear Numbers — There are colorful groups of big moving objects, such as ducks, birds and bears, that reinforce numbers and counting skills. You can use the space bar to learn to count up and down. The many possible picture combinations work to captivate youngsters with an endless variety of picture shows and give them plenty of hands on computer experience. (32 page book, disk, colorful Stickybear poster, Stickybear stickers.) (Disk) List $34.95. **Sale $14.95.**

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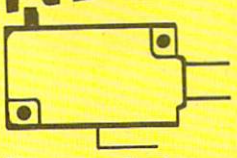

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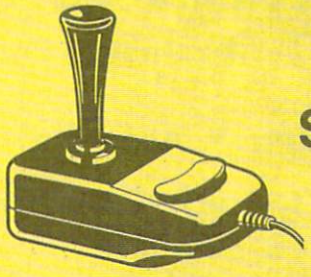

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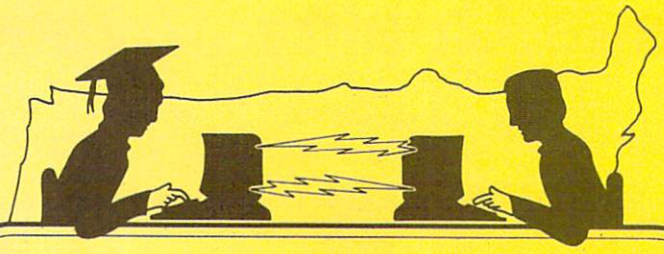

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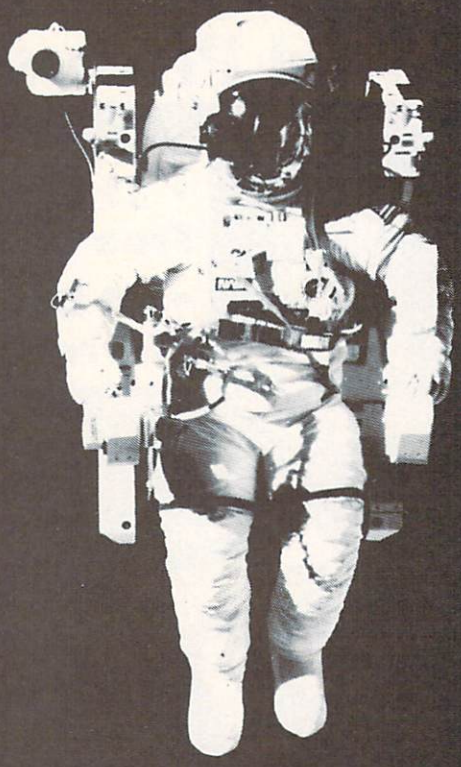

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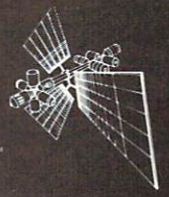

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Reader Service No. 202

FLOTSAM

I just received GEOS in the mail and immediately consumed the reference manual. With preliminaries out of the way, I sat down to experience my new world. My fun soon turned to despair as the backup utility failed to copy onto a brand new disk. With a little testing, I determined a misaligned disk drive was the culprit. Oh brother. I considered ordering a disk alignment program through the mail, but that takes time and my new program would lie dormant. I was not about to invite tragedy by working with the original disk. But somewhere in the back of my mind, I remembered such a utility being published in a magazine. After a frantic search through all of my back issues with no luck, I finally dug up a magazine I had been entering a program from and had not yet checked. *Ahoy!* issue 26—Feb. '86—on page 83. *Yes!* That's where it was! For two hours I performed surgery with the tools and instructions I found there. The patient not only survived, but is doing great! And best of all, I got to dive head first into GEOS that night! So all I really wrote to say is THANK YOU!! for such a useful article.

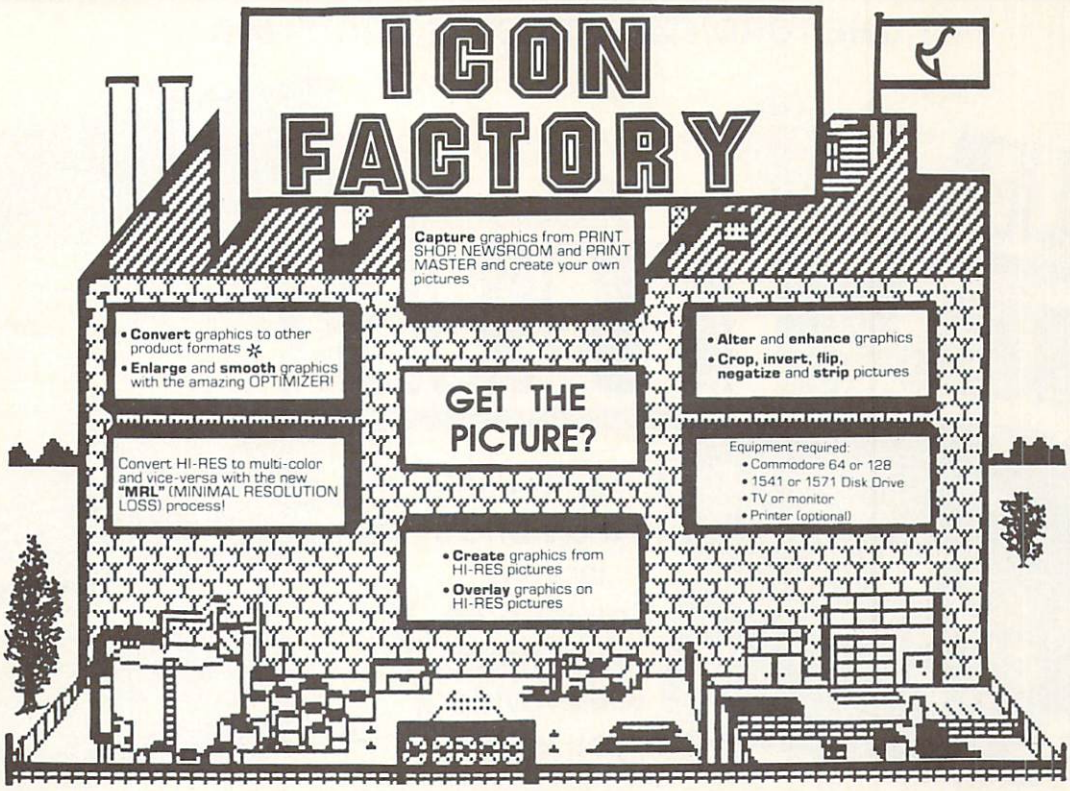
—Thomas P. Shultz
Clarion, PA

I am not a subscriber to your magazine, but I do pick it up at the newsstand fairly regularly. It's reasonably well done and the price makes it stand out. Though in general I approve of what you do, I take offense at an ad which appeared in the June 1986 issue on page 55. It's for a C-64 program called *The Attractor.* This kind of sexist sleaze has no business in this magazine. Perhaps Bob Guccione would run it, but a mature computer magazine should not. The ad appears to be aimed at 14 year old boys and at lonely, desperate computer jocks. It is degrading to both women and computer professionals. Be it known that there is at least one computer professional who reads this magazine who is above the age of 14 and who has a perfectly healthy social life. I suspect that I'm not alone. It might be interesting to poll your readers as to age group and profession to see if such an ad really reaches its intended audience.

I think it might behoove your editorial staff to take a closer look at what is getting printed. I dislike the thought of anyone playing censor, but on the other hand, this kind of sleazeware gives the software industry a bad name. The "programmers" who write this kind of pseudo-psychological crap and the marketing people who foist it off on us don't deserve a second look, let alone a full page ad. *New Yorker* would likely not print an ad for those "How to get a girl" books and *Science Digest* would not run an ad for spanish fly, so why should you feel obligated to run this sort of ad? If you need to increase revenue, try raising your price by a dime or so. Surely quality is worth that.

—Gary R. Heffelfinger
Greenville, SC

ICON FACTORY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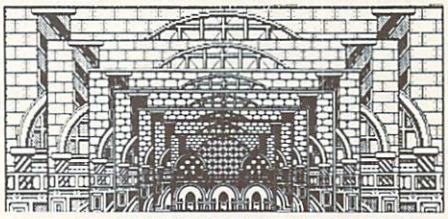

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PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listing guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart . The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.)

Also on the following page you will find *Flankspeed*, our ML entry program, and instructions on its use. □

Call *Ahoy!* at 212-239-0855 with any problems.

When You See	It Means	You Type		You Will See
[CLEAR]	Screen Clear	SHIFT	CLR/HOME	
[HOME]	Home		CLR/HOME	
[UP]	Cursor Up	SHIFT	↑ CRSR ↑	
[DOWN]	Cursor Down		↑ CRSR ↑	
[LEFT]	Cursor Left	SHIFT	← CRSR ←	
[RIGHT]	Cursor Right		← CRSR ←	
[SS]	Shifted Space	SHIFT	Space	
[INSERT]	Insert	SHIFT	INST/DEL	
[DEL]	Delete		INST/DEL	
[RVSON]	Reverse On	CNTRL	9	
[RVSOFF]	Reverse Off	CNTRL	0	
[UPARROW]	Up Arrow		↑	
[BACKARROW]	Back Arrow		←	
[PI]	PI		π	
[EP]	English Pound		£	

When You See	It Means	You Type		You Will See
[BLACK]	Black	CNTRL	1	
[WHITE]	White	CNTRL	2	
[RED]	Red	CNTRL	3	
[CYAN]	Cyan	CNTRL	4	
[PURPLE]	Purple	CNTRL	5	
[GREEN]	Green	CNTRL	6	
[BLUE]	Blue	CNTRL	7	
[YELLOW]	Yellow	CNTRL	8	
[F1]	Function 1		F1	
[F2]	Function 2	SHIFT	F1	
[F3]	Function 3		F3	
[F4]	Function 4	SHIFT	F3	
[F5]	Function 5		F5	
[F6]	Function 6	SHIFT	F5	
[F7]	Function 7		F7	
[F8]	Function 8	SHIFT	F7	

BUG REPELLENT By MICHAEL KLEINERT and DAVID BARRON

Bug Repellent is a checksum program used for proofreading BASIC listings typed in from *Ahoy!* magazine. For each program line you enter, *Bug Repellent* will produce a two-letter code that should match the code listed beside that line in the magazine.

Type in, save, and run the *Bug Repellent*. (If you have a C-64, type in the C-64 version. If you have a C-128, you will need to type in the C-64 version for use with C-64 programs, and the C-128 version for use with C-128 programs.) If you have typed in *Bug Repellent* properly, you will get the message BUG REPELLENT INSTALLED; otherwise you will get an error message. If you get an error message, double check the *Bug Repellent* program for typing mistakes. Type NEW and hit RETURN. Then type in and save, or load, the *Ahoy!* program you wish to check. Type in SYS 49152 for the C-64 version or SYS 3072 for the C-128 version and hit RETURN (this will begin execution of *Bug Repellent*). You will see the prompt SCREEN OR PRINTER ? Hit S if you want the codes listed on the screen, or P if you want them listed on the printer. To pause the listing depress and hold the SHIFT key.

Compare the codes your machine generates to those listed to the right of the corresponding program lines. If you spot a difference, that line contains an error. Write down the numbers of the lines where the contradictions occur. LIST each line, locate the errors, and correct them.

COMMODORE 64 VERSION

```
·100 FOR X = 49152 TO 49488:READY:S=S+Y                    AB
·110 IF Y<0 OR Y>255 THEN 130                              EA
·120 POKE X,Y:NEXT:GOTO140                                 ID
·130 PRINT"[CLEAR][DOWN]**ERROR**":PRINT"[DOWN
]PLEASE CHECK LINE"PEEK(64)*256+PEEK(63):END               ID
·140 IF S<>44677 THEN PRINT"[CLEAR][DOWN]**ERR
OR**":PRINT"[DOWN]PLEASE CHECK DATA LINES 170
-500":END                                                  HJ
·150 PRINT"[CLEAR]":POKE53280,0:POKE53281,6:PO
KE646,1                                                    NP
·160 PRINT"[RVSON][6" "]C-64 BUG REPELLENT INS
TALLED[6" "]"                                              LF
·170 DATA32,161,192,165,43,133,251,165,44,133              DL
·180 DATA252,160,0,132,254,32,37,193,234,177               DB
·190 DATA251,208,3,76,138,192,230,251,208,2                OF
·200 DATA230,252,76,43,192,76,73,78,69,32                  KN
·210 DATA35,32,0,169,35,160,192,32,30,171                  CA
·220 DATA160,0,177,251,170,230,251,208,2,230               CE
·230 DATA252,177,251,32,205,189,169,58,32,210              JE
·240 DATA255,169,0,133,253,230,254,32,37,193               CL
·250 DATA234,165,253,160,0,76,13,193,133,253               NB
·260 DATA177,251,208,237,165,253,41,240,74,74              MB
·270 DATA74,74,24,105,65,32,210,255,165,253                EP
·280 DATA 41,15,24,105,65,32,210,255,169,13                GH
·290 DATA32,220,192,230,63,208,2,230,64,230                AN
·300 DATA251,208,2,230,252,76,11,192,169,153               NG
·310 DATA160,192,32,30,171,166,63,165,64,76                BF
·320 DATA231,192,96,76,73,78,69,83,58,32                   EP
·330 DATA0,169,247,160,192,32,30,171,169,3                 PJ
·340 DATA133,254,32,228,255,201,83,240,6,201               FK
·350 DATA80,208,245,230,254,32,210,255,169,4               FL
·360 DATA166,254,160,255,32,186,255,169,0,133              CL
·370 DATA63,133,64,133,2,32,189,255,32,192                 GC
·380 DATA255,166,254,32,201,255,76,73,193,96               NN
·390 DATA32,210,255,173,141,2,41,1,208,249                 NH
·400 DATA96,32,205,189,169,13,32,210,255,32                IM
·410 DATA204,255,169,4,76,195,255,147,83,67                KC
·420 DATA82,69,69,78,32,79,82,32,80,82                     DC
·430 DATA 73,78,84,69,82,32,63,32,0,76                     ML
·440 DATA44,193,234,177,251,201,32,240,6,138               GN
·450 DATA113,251,69,254,170,138,76,88,192,0                JK
·460 DATA0,0,0,230,251,208,2,230,252,96                    NA
·470 DATA170,177,251,201,34,208,6,165,2,73                 DM
·480 DATA255,133,2,165,2,208,218,177,251,201               JA
·490 DATA32,208,212,198,254,76,29,193,0,169                FM
·500 DATA13,76,210,255,0,0,0                               PA
```

COMMODORE 128 VERSION

```
·100 FAST:FOR X = 3072 TO 3520:READ Y:POKE X,Y
:S=S+Y:TRAP110:NEXT:SLOW                                   IH
·110 SLOW:IF S<>49057 THEN PRINT"[CLEAR][DOWN]
**ERROR**":PRINT"[DOWN]PLEASE CHECK DATA LINE
S 140-390":END                                             JA
·120 PRINT"[CLEAR][DOWN]  C-128 BUG REPELLENT
INSTALLED"                                                 II
·130 PRINT"[4" "]TYPE SYS 3072 TO ACTIVATE"                IN
·140 DATA 32,161,12,165,45,133,251,165,46,133,
252,160,0,132,254,32,37                                    OF
·150 DATA 13,234,177,251,208,3,76,138,12,230,2
51,208,2,230,252,76,43                                     NC
·160 DATA 12,76,73,78,69,32,35,32,0,169,35,160
,12,32,80,13,160,0,177                                     OL
·170 DATA 251,170,230,251,208,2,230,252,177,25
1,32,89,13,169,58,32,98                                    EF
·180 DATA 13,169,0,133,253,230,254,32,37,13,23
4,165,253,160,0,76,13                                      JO
·190 DATA 13,133,253,177,251,208,237,165,253,4
1,240,74,74,74,74,24                                       LC
·200 DATA 105,65,32,98,13,165,253,41,15,24,105
,65,32,98,13,169,13,32                                     DE
·210 DATA 220,12,230,65,208,2,230,66,230,251,2
08,2,230,252,76,11,12                                      GM
·220 DATA 169,153,160,12,32,80,13,166,65,165,6
6,76,231,12,96,76,73,78                                    CP
·230 DATA 69,83,58,32,0,169,247,160,12,32,80,1
3,169,3,133,254,32,107                                     HC
·240 DATA 13,201,83,240,6,201,80,208,245,230,2
54,32,98,13,169,4,166                                      GK
·250 DATA 254,160,255,32,116,13,169,0,133,65,1
33,66,133,250,32,125,13                                    LB
·260 DATA 32,134,13,166,254,32,143,13,76,73,13
,96,32,98,13,165,211                                       JF
·270 DATA 234,41,1,208,249,96,32,89,13,169,13,
32,98,13,32,152,13,169,4                                   GD
·280 DATA 76,161,13,147,83,67,82,69,69,78,32,7
9,82,32,80,82,73,78,84,69                                  PL
·290 DATA 82,32,63,32,0,76,44,13,234,177,251,2
01,32,240,6,138,113,251,69                                 OK
·300 DATA 254,170,138,76,88,12,0,0,0,0,230,251
,208,2,230,252,96,170,177                                  FJ
·310 DATA 251,201,34,208,6,165,250,73,255,133,
250,165,250,208,218,177                                    GA
·320 DATA 251,201,32,208,212,198,254,76,29,13,
0,169,13,76,98,13,0,0,32                                   FI
·330 DATA 170,13,32,226,85,76,180,13,32,170,13
,32,50,142,76,180,13,32                                    OF
·340 DATA 170,13,32,210,255,76,180,13,32,170,1
3,32,228,255,76,180,13,32                                  AK
·350 DATA 170,13,32,186,255,76,180,13,32,170,1
3,32,189,255                                               BP
·360 DATA 76,180,13,32,170,13,32,192,255,76,18
0,13,32,170,13                                             FP
·370 DATA 32,201,255,76,180,13,32,170,13,32,20
4,255,76,180,13,32,170                                     ID
·380 DATA 13,32,195,255,76,180,13,133,67,169,0
,141,0,255,165,67,96                                       BJ
·390 DATA 133,67,169,0,141,1,255,165,67,96,0,0
,0                                                         IF
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1 – SAVEs what you have entered so far.

f3 – LOADs in a program worked on previously.

f5 – To continue on a line you stopped on after LOADing in the previous saved work.

f7 – Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program.

f7 temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                                    LL
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";          ED
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
]"                                                                MC
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"             DM
·120 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNATIONAL INC.
[3" "]"                                                           DH
·125 FORA=54272TO54296:POKEA,0:NEXT                               IM
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
KE54296,15                                                        NH
·135 FORA=680TO699:READB:POKEA,B:NEXT                             KO
·140 DATA169,251,166,253,164,254,32,216,255,96                    HJ
·145 DATA169,0,166,251,164,252,32,213,255,96                      JB
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B              KA
·155 GOSUB480:IFB=0THEN150                                        GN
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16                    KE
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B                     LO
·170 GOSUB470:IFB=0THEN150                                        EE
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                        MN
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                       GE
·185 POKE253,B:PRINT                                              HN
·190 REM  GET HEX LINE                                            IL
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8                     NH
·200 FORB=0TO1:GOTO250                                            MP
·205 NEXTB                                                        ME
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                        LE
·215 PRINT" [c P][LEFT]";                                         IK
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                        PD
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                       LK
·230 NEXT                                                         IA
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                               LE
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195                BI
·245 REM    GET HEX INPUT                                         AB
·250 GETA$:IFA$=""THEN250                                         HK
·255 IFA$=CHR$(20)THEN305                                         HF
·260 IFA$=CHR$(133)THEN535                                        KH
·265 IFA$=CHR$(134)THEN560                                        JM
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                           EG
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                           AB
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295                 DL
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295                 MD
·290 GOSUB415:GOTO250                                             JJ
·295 PRINTA$"[c P][LEFT]";                                        OA
·300 GOTO205                                                      CF
·305 IFA>0THEN320                                                 PG
·310 A=-1:IFB=1THEN330                                            OI
·315 GOTO220                                                      BM
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                       HG
·325 A=A-1                                                        BE
·330 PRINTCHR$(20);:GOTO220                                       LK
·335 REM LAST LINE                                                AD
·340 PRINT" ":T=AD-(INT(AD/256)*256)                              GJ
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255                     PL
·350 NEXT                                                         IA
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                               NF
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                              HN
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                       JA
·370 REM BELL AND ERROR MESSAGES                                  FL
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415          DA
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415              FF
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
5                                                                 HD
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
GOTO415                                                           OK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415               FN
·400 PRINT"?ERROR IN SAVE":GOTO415                                PP
·405 PRINT"?ERROR IN LOAD":GOTO415                                PO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                      PG
·415 POKE54276,17:POKE54276,16:RETURN                             BH
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN             IM
·425 REM GET FOUR DIGIT HEX                                       PC
·430 PRINT:PRINTB$;:INPUTT$                                       GM
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                             NP
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
380:GOTO430                                                       FJ
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN          GF
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN                  EH
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN                  KP
·460 T(A)=16:RETURN                                               NP
·465 REM ADRESS CHECK                                             LI
·470 IFAD>ENTHEN385                                               LB
·475 IFB<SRORB>ENTHEN390                                          KC
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395                 MG
·485 RETURN                                                       IM
·490 REM ADDRESS TO HEX                                           EB
·495 AC=AD:A=4096:GOSUB520                                        FD
·500 A=256:GOSUB520                                               PE
·505 A=16:GOSUB520                                                MI
·510 A=1:GOSUB520                                                 IL
·515 RETURN                                                       IM
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530                   PE
·525 A$=CHR$(T+48)                                                JP
·530 PRINTA$;:AC=AC-A*T:RETURN                                    AC
·535 A$="**SAVE**":GOSUB585                                       LH
·540 OPEN1,T,1,A$:SYS680:CLOSE1                                   LH
·545 IFST=0THENEND                                                EO
·550 GOSUB400:IFT=8THENGOSUB420                                   CM
·555 GOTO535                                                      CL
·560 A$="**LOAD**":GOSUB585                                       NE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                                   MF
·570 IFST=64THEN195                                               LC
·575 GOSUB405:IFT=8THENGOSUB420                                   AN
·580 GOTO560                                                      CL
·585 PRINT" ":PRINTTAB(14)A$                                      FG
·590 PRINT:A$="":INPUT"FILENAME";A$                               OM
·595 IFA$=""THEN590                                               DD
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                             DF
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN                 IG
·610 IFB$<>"T"THEN605                                             BO
·615 RETURN                                                       IM
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B                     OH
·625 GOSUB475:IFB=0THEN620                                        GH
·630 PRINT:GOTO195                                                PH
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B                     FA
·640 GOSUB475:IFB=0THEN635                                        IB
·645 PRINT:GOTO670                                                PP
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
OSUB410:GOTO195                                                   NK
·655 PRINT" ";:NEXTB                                              EC
·660 PRINT:AD=AD+8                                                GN
·665 GETB$:IFB$=CHR$(136)THEN195                                  LI
·670 GOSUB495:PRINT": ";:GOTO650                                  IB
```

THE SHADOW KNOWS

FROM PAGE 27

Assembler required for entry! See introductory article.

SPRITE 1

```
;
; SPRITE1
;
          ORG   $1300
;
COLOR     EQU   $E0
;
TABLEN    EQU   $800
MAPLEN    EQU   1000
SCRLEN    EQU   8000
SPOADR    EQU   $4E00
COLMAP    EQU   $5C00
NEWADR    EQU   $4000
;
SPRPTR    EQU   $5FF8
SPENA     EQU   $D015
SPOCOL    EQU   $D027
SPOX      EQU   $11D6
SPOY      EQU   $11D7
MSIGX     EQU   $11E6
YXPAND    EQU   $D017
XXPAND    EQU   $D01D
;
INDFET    EQU   $FF74
;
HMAX      EQU   320
VMID      EQU   100-8
;
R6510     EQU   $0001
BASE      EQU   $6000
CHRBAS    EQU   $D000
SCROLY    EQU   $D011
SVMCSB    EQU   $A2D
BORDER    EQU   $D020
CIACRE    EQU   $DC0E
CI2PRA    EQU   $DD00
CIADIR    EQU   $DD02
;
TMPA      EQU   $C8
TMPB      EQU   TMPA+2
TPTR      EQU   TMPA
;
MSRC      EQU   $FA
MDST      EQU   MSRC+2
BPTR      EQU   MDST+2
;
TABSIZ    EQU   $0C00
;
HPSN      EQU   TABSIZ+2
VPSN      EQU   HPSN+2
CHAR      EQU   VPSN+1
ROW       EQU   CHAR+1
LINE      EQU   ROW+1
BYTE      EQU   LINE+1
BITT      EQU   BYTE+2
;
MPRL      EQU   BITT+1
MPRH      EQU   MPRL+1
MPDL      EQU   MPRH+1
MPDH      EQU   MPDL+1
PRODL     EQU   MPDH+1
PRODH     EQU   PRODL+1
FILVAL    EQU   PRODH+1
LENPTR    EQU   FILVAL+1
CHCODE    EQU   LENPTR+2
HPTR      EQU   CHCODE+2
VPTR      EQU   HPTR+2
ONEBYT    EQU   VPTR+1
COUNT     EQU   ONEBYT+2
LTTR      EQU   COUNT+1
;
          JMP   START
;
TEXT      DFB   9,32,32,13
          DFB   25,32,3,15
          DFB   13,13,15,4
          DFB   15,18,5,32
          DFB   49,50,56,0
;
; BLOCK FILL ROUTINE
;
BLKFIL    LDA   FILVAL
          LDX   TABSIZ+1
          BEQ   PARTPG
          LDY   #0
FULLPG    STA   (TPTR),Y
          INY
          BNE   FULLPG
          INC   TPTR+1
          DEX
          BNE   FULLPG
PARTPG    LDX   TABSIZ
          BEQ   FINI
          LDY   #0
PARTLP    STA   (TPTR),Y
          INY
          DEX
          BNE   PARTLP
FINI      RTS
;
; MULTIPLICATION ROUTINE
;
MULT16    LDA   #0
          STA   PRODL
          STA   PRODH
          LDX   #17
          CLC
MULT      ROR   PRODH
          ROR   MPRH
          ROR   MPRL
          BCC   CTDOWN
          CLC
          LDA   MPDL
          ADC   PRODL
          STA   PRODL
          LDA   MPDH
          ADC   PRODH
          STA   PRODH
CTDOWN    DEX
          BNE   MULT
          RTS
;
; PLOT ROUTINE
;
; ROW=VPSN/8
;
PLOT      LDA   VPSN
          LSR   A
          LSR   A
          LSR   A
          STA   ROW
;
; CHAR=HPSN/8
;
          LDA   HPSN
          STA   TMPA
          LDA   HPSN+1
          STA   TMPA+1
          LDX   #3
DLOOP     LSR   TMPA+1
          ROR   TMPA
          DEX
          BNE   DLOOP
          LDA   TMPA
          STA   CHAR
;
; LINE=VPSN AND 7
;
          LDA   VPSN
          AND   #7
          STA   LINE
;
; BITT=7-(HPSN AND 7)
;
          LDA   HPSN
          AND   #7
          STA   BITT
          SEC
          LDA   #7
          SBC   BITT
          STA   BITT
;
; BYTE=BASE+ROW*HMAX
;       +8*CHAR+LINE
; MULTIPLY ROW * HMAX
;
```

```
168           LDA   ROW
169           STA   MPRL
170           LDA   #0
171           STA   MPRH
172           LDA   #<HMAX
173           STA   MPDL
174           LDA   #>HMAX
175           STA   MPDH
176           JSR   MULT16
177           LDA   MPRL
178           STA   TMPA
179           LDA   MPRL+1
180           STA   TMPA+1
181 *
182 * ADD PRODUCT TO BASE
183 *
184           CLC
185           LDA   #<BASE
186           ADC   TMPA
187           STA   TMPA
188           LDA   #>BASE
189           ADC   TMPA+1
190           STA   TMPA+1
191 *
192 * MULTIPLY 8 * CHAR
193 *
194           LDA   #8
195           STA   MPRL
196           LDA   #0
197           STA   MPRH
198           LDA   CHAR
199           STA   MPDL
200           LDA   #0
201           STA   MPDH
202           JSR   MULT16
203           LDA   MPRL
204           STA   TMPB
205           LDA   MPRH
206           STA   TMPB+1
207 *
208 * ADD LINE
209 *
210           CLC
211           LDA   TMPB
212           ADC   LINE
213           STA   TMPB
214           LDA   TMPB+1
215           ADC   #0
216           STA   TMPB+1
217 *
218 * TMPA + TMPB = BYTE
219 *
220           CLC
221           LDA   TMPA
222           ADC   TMPB
223           STA   TMPB
224           LDA   TMPA+1
225           ADC   TMPB+1
226           STA   TMPB+1
227 *
228 * BYTE=PEEK(BYTE)OR2^BIT
229 *
230           LDX   BITT
231           INX
232           LDA   #0
233           SEC
234 SQUARE    ROL
235           DEX
236           BNE   SQUARE
237           LDY   #0
238           ORA   (TMPB),Y
239           STA   (TMPB),Y
240           RTS
241 *
242 * CALCULATE CHCODE
243 * ADDRESS
244 GETADR    LDA   #0
245           STA   CHCODE+1
246           LDA   CHCODE
247           CLC
248           ASL   A
249           ROL   CHCODE+1
250           ASL   A
251           ROL   CHCODE+1
252           ASL   A
253           ROL   CHCODE+1
254           STA   CHCODE
255 *
256           CLC
257           LDA   CHCODE
258           ADC   #<NEWADR
259           STA   BPTR
260           LDA   CHCODE+1
261           ADC   #>NEWADR
262           STA   BPTR+1
263           RTS
264 *
265 * DRAW A CHARACTER
266 *
267 DRAWCH    LDA   LTTR
268           STA   CHCODE
269           JSR   GETADR
270 *
271 * A NESTED LOOP:
272 *
273 * (X IS THE OUTSIDE
274 * LOOP)
275           LDX   #8
276 *
277 * DRAW 2 VERT LINES
278 *
279 SETLIN    LDA   #2
280           STA   COUNT
281 *
282 DRAWLN    LDY   #0
283           LDA   (BPTR),Y
284           STA   ONEBYT
285 *
286 * THE INSIDE LOOP:
287 *
288 * (Y IS ZERO AT START)
289 *
290 RSHIFT    LDA   ONEBYT
291           ASL   A
292           STA   ONEBYT
293           BCS   SHOW
294 *
295           INC   HPSN
296           BNE   ITSOK
297           INC   HPSN+1
298 ITSOK     JMP   NOSHOW
299 *
300 * DISPLAY BIT
301 *
302 * SAVE X AND Y REGISTERS
303 *
304 SHOW      TXA
305           PHA
306           TYA
307           PHA
308 *
309           JSR   PLOT
310 *
311 * NOW DO IT AGAIN
312 *
313           INC   HPSN
314           BNE   NOINC
315           INC   HPSN+1
316 *
317 NOINC     JSR   PLOT
318 *
319 * RETRIEVE X, Y
320 * REGISTERS
321           PLA
322           TAY
323           PLA
324           TAX
325 *
326 NOSHOW    INC   HPSN
327           BNE   LEAP
328           INC   HPSN+1
329 *
330 LEAP      INY
331           CPY   #8
332           BCC   RSHIFT
333 *
334           INC   VPSN
335 *
336           LDA   HPTR
337           STA   HPSN
338           LDA   HPTR+1
339           STA   HPSN+1
340 *
341 * 2 VERT LINES DONE YET?
```

```
342 *
343           DEC   COUNT
344           BNE   DRAWLN
345 *
346           INC   BPTR
347           BNE   OKMSB
348           INC   BPTR+1
349 OKMSB      DEX
350           BNE   SETLIN
351           RTS
352 *
353 * COPY CHR SET INTO RAM
354 *
355 * PUT DATA IN NEW SPOT
356 *
357 COPYCHRS LDA   #<CHRBAS
358           STA   MSRC
359           LDA   #>CHRBAS
360           STA   MSRC+1
361 *
362           LDA   #<NEWADR
363           STA   MDST
364           LDA   #>NEWADR
365           STA   MDST+1
366 *
367           LDA   #<TABLEN
368           STA   LENPTR
369           LDA   #>TABLEN
370           STA   LENPTR+1
371 *
372           LDY   #0
373           LDX   LENPTR+1
374           BEQ   MVPART
375 MVPAGE    JSR   GETDATA
376           INY
377           BNE   MVPAGE
378           INC   MSRC+1
379           INC   MDST+1
380           DEX
381           BNE   MVPAGE
382 MVPART    LDX   LENPTR
383           BEQ   MVEXIT
384 MVLAST    JSR   GETDATA
385           INY
386           DEX
387           BNE   MVLAST
388 MVEXIT    RTS
389 *
390 * USE INDFET ROUTINE
391 *
392 GETDATA   PHA
393           TXA
394           PHA
395           LDA   #MSRC
396           LDX   #14
397           JSR   INDFET
398           STA   (MDST),Y
399           PLA
400           TAX
401           PLA
402           RTS
403 *
404 *
405 * MAIN ROUTINE
406 *
407 START     JSR   COPYCHRS
408 *
409           LDA   #$20
410           STA   $D8
411 *
412 * USE VIDEO BANK 2
413 *
414           LDA   #0
415           STA   $FF00
416           LDA   CI2PRA
417           AND   #$FC
418           ORA   #$02
419           STA   CI2PRA
420           STA   $FF01
421 *
422 * SCREEN MAP AT $6000,
423 * COLOR MAP AT $5C00
424 *
425           LDA   #$78
426           STA   SVMCSB
427 *
428 * CLEAR BIT MAP
429 *
430           LDA   #0
431           STA   FILVAL
432           LDA   #<BASE
433           STA   TPTR
434           LDA   #>BASE
435           STA   TPTR+1
436           LDA   #<SCRLEN
437           STA   TABSIZ
438           LDA   #>SCRLEN
439           STA   TABSIZ+1
440           JSR   BLKFIL
441 *
442 * SET COLORS
443 *
444           LDA   #COLOR
445           STA   FILVAL
446           LDA   #<COLMAP
447           STA   TPTR
448           LDA   #>COLMAP
449           STA   TPTR+1
450           LDA   #<MAPLEN
451           STA   TABSIZ
452           LDA   #>MAPLEN
453           STA   TABSIZ+1
454           JSR   BLKFIL
455           LDA   #13
456           STA   BORDER
457 *
458 * POSITION MESSAGE ON
459 * SCREEN
460           LDA   #8
461           STA   HPSN
462           STA   HPTR
463           LDA   #0
464           STA   HPSN+1
465           STA   HPTR+1
466           LDA   #VMID
467           STA   VPSN
468           STA   VPTR
469 *
470 * PRINT LARGE TYPE
471 *
472           LDX   #0
473 DISP      LDA   TEXT,X
474           CMP   #0
475           BEQ   DONE
476           STA   LTTR
477           TXA
478           PHA
479           JSR   DRAWCH
480           PLA
481           TAX
482 *
483 * ADVANCE CURSOR
484 *
485           CLC
486           LDA   HPTR
487           ADC   #16
488           STA   HPTR
489           STA   HPSN
490           LDA   HPTR+1
491           ADC   #0
492           STA   HPTR+1
493           STA   HPSN+1
494           LDA   VPTR
495           STA   VPSN
496 *
497 * PRINT NEXT LETTER
498 *
499           INX
500           JMP   DISP
501 *
502 DONE      JMP   DONE
```


PROGRAMS NEEDED!

Send yours on disk, accompanied by a program printout, documentation, and a stamped, self-addressed envelope to:

Ahoy! Program Submissions
Ion International Inc.
45 West 34th Street—Suite 407
New York, NY 10001

TENPINS
FROM PAGE 77

Starting address in hex: C000
Ending address in hex: C71E
SYS to start: 49152

***Flankspeed* required for entry! See page 121.**

```
C000: A9 FF A0 00 99 40 3E C8 2B
C008: C0 2A 90 F8 A9 00 99 40 FF
C010: 3E C8 C0 40 90 F8 A8 B9 04
C018: DF C5 99 80 3E C8 D0 F7 A7
C020: B9 DF C6 99 80 3F C8 C0 63
C028: 40 90 F5 A9 00 99 80 3F F1
C030: C8 10 FA A9 78 8D EF 3F E2
C038: 8D FB 3F A9 FC 8D F2 3F 67
C040: 8D F5 3F 8D F8 3F A0 18 81
C048: B9 D0 C4 99 00 D4 88 10 9E
C050: F7 8C F9 07 C8 8C 20 D0 1C
C058: 8C 25 D0 8C 28 D0 C8 8C B5
C060: 1C D0 A0 0A 8C 26 D0 C8 44
C068: 8C 29 D0 A9 04 8D 1B D0 16
C070: 8D 1D D0 8D 04 D0 A9 F9 F1
C078: 8D FA 07 78 A9 7F 8D 0D 44
C080: DC A9 01 8D 1A D0 8D 12 20
C088: D0 A9 1B 8D 11 D0 A9 66 9D
C090: 8D 14 03 A9 C4 8D 15 03 49
C098: 58 A9 00 8D 15 D0 A9 75 2D
C0A0: A0 C5 20 1E AB A9 B7 20 72
C0A8: 3D C4 A0 01 84 05 84 FB 56
C0B0: A2 04 C8 18 20 F0 FF A9 F2
C0B8: 20 20 D2 FF 20 D2 FF A6 65
C0C0: FB A9 00 20 CD BD E6 FB F4
C0C8: A5 FB C9 0B 90 E9 A9 6D D0
C0D0: A0 C5 20 1E AB A2 08 8A 56
C0D8: 29 01 A8 B9 BC C4 20 D2 D9
C0E0: FF 20 D2 FF A0 0C 20 D2 73
C0E8: FF 48 BD BE C4 20 D2 FF 65
C0F0: 68 20 D2 FF 88 D0 EF 20 B5
C0F8: D2 FF BD C7 C4 20 D2 FF 09
C100: CA 10 D4 A9 C4 20 3D C4 40
C108: A9 08 8D 86 02 A9 0D 20 A6
C110: D2 FF A9 B7 20 3D C4 A2 09
C118: 17 A0 00 18 20 F0 FF A9 A2
C120: C4 20 3D C4 A2 13 A0 0D 6A
C128: 18 20 F0 FF A9 3D A0 C5 9E
C130: 20 1E AB A9 00 85 C6 A5 B5
C138: A2 29 10 0A 0A 0A 09 20 5B
C140: 8D 13 07 20 E4 FF C9 31 E7
C148: 90 ED C9 35 B0 E9 20 D2 53
C150: FF 29 0F 8D A3 C4 A2 00 21
C158: 20 79 C3 A2 13 20 FF E9 75
C160: A9 07 8D 15 D0 A9 00 85 B3
C168: 04 A4 04 B9 A7 C4 8D 27 EF
C170: D0 B9 AC C4 8D 05 D0 BE 8E
C178: B8 C4 A5 05 0A 18 65 05 2D
C180: A8 C8 18 20 F0 FF 20 3F 7A
C188: C2 A0 00 20 24 C4 20 D2 E7
C190: FF C9 D6 D0 05 A9 2D 4C 2A
C198: A2 C1 20 52 C2 A0 01 20 F3
C1A0: 24 C4 20 D2 FF 20 82 C3 E2
C1A8: A2 02 A0 1E B1 02 C9 2D B6
C1B0: F0 05 CA C9 4E D0 5C 8E 45
C1B8: A4 C4 8A 09 30 8D 5D C5 96
C1C0: BD 6A C5 8D 69 C5 A9 5D 72
C1C8: A0 C5 20 46 C4 A9 5D A0 02
C1D0: C5 20 46 C4 A4 04 BE B8 E1
C1D8: C4 A0 22 18 20 F0 FF 20 A9
C1E0: 3F C2 A0 00 20 24 C4 20 AC
C1E8: D2 FF C9 D6 D0 12 A9 2D 16
C1F0: 20 D2 FF A9 1D 20 D2 FF 9D
C1F8: CE A4 C4 D0 E2 4C 10 C2 04
C200: CE A4 C4 F0 0B 20 52 C2 69
C208: A0 01 20 24 C4 20 D2 FF A5
C210: 20 82 C3 E6 04 A5 04 CD D8
C218: A3 C4 B0 03 4C 69 C1 E6 92
C220: 05 A5 05 C9 0B B0 03 4C A4
C228: 65 C1 A9 00 85 C6 A9 4F 3E
C230: A0 C5 20 46 C4 20 E4 FF C6
C238: C9 00 F0 F2 4C 99 C0 A0 2D
C240: 09 BE E9 C4 B9 F3 C4 9D C6
C248: F6 06 A9 01 9D F6 DA 88 E7
C250: 10 EF A9 D6 8D A2 C4 A9 6F
C258: 00 8D 10 D0 8D 03 D0 85 AD
C260: FB A9 1B 8D 00 D0 A9 FE 28
C268: 8D F8 07 AD 00 DC 29 03 AC
C270: A8 18 B9 9B C4 6D A2 C4 20
C278: C9 A7 90 07 C9 D7 B0 03 D6
C280: 8D A2 C4 A2 0A 20 79 C3 7F
C288: AD 00 DC 29 10 D0 DC A0 9A
C290: 03 A2 3A 20 79 C3 CE F8 95
C298: 07 EE 00 D0 88 10 F2 AD 98
C2A0: A2 C4 8D 03 D0 A9 25 8D C5
C2A8: 02 D0 A9 81 8D 04 D4 AD BA
C2B0: 1F D0 AD 02 D0 29 1F D0 3A
C2B8: 18 AD 00 DC 29 03 AA AD DF
C2C0: 03 D0 C9 A7 90 0B C9 D7 43
C2C8: B0 07 18 7D 9B C4 8D 03 07
C2D0: D0 EE 02 D0 D0 05 A9 02 E4
C2D8: 8D 10 D0 C0 0A 90 2D 98 68
C2E0: 10 5E AD 1F D0 29 02 F0 09
C2E8: 57 A2 80 8E 0B D4 8E 12 72
C2F0: D4 E8 8E 0B D4 8E 12 D4 92
C2F8: 38 AD 03 D0 E9 AF 0A AA 01
C300: BD FD C4 8D 9F C4 BD FE 2F
C308: C4 8D A0 C4 C8 C0 0A B0 04
C310: 17 4E A0 C4 6E 9F C4 90 3E
C318: F3 BE E9 C4 A9 20 DD F6 18
C320: 06 F0 E9 9D F6 06 E6 FB 7E
C328: 98 29 01 49 01 0A 48 0A 91
C330: 0A 8D 0F D4 68 18 69 07 9C
C338: 8D 08 D4 A2 02 20 79 C3 A4
C340: A2 03 20 79 C3 AD 10 D0 D1
C348: F0 07 AD 02 D0 C9 50 B0 8B
C350: 03 4C B2 C2 A9 80 8D 04 D0
C358: D4 A9 D7 8D 03 D0 A2 02 B4
```

```
C360: 20 79 C3 AC 02 D0 D0 03 11
C368: 8C 10 D0 CE 02 D0 AD 10 35
C370: D0 D0 EB 88 C0 2D B0 E6 0C
C378: 60 EE A1 C4 D0 FB CA D0 96
C380: F8 60 A4 04 B9 B0 C4 85 37
C388: 02 B9 B4 C4 85 03 BE B8 BD
C390: C4 A0 00 84 FD 84 FE 18 14
C398: 20 F0 FF A0 01 84 A7 A5 1D
C3A0: A7 0A 18 65 A7 A8 20 04 44
C3A8: C4 85 A8 8A C9 20 F0 1F 20
C3B0: A2 02 C9 2D F0 27 CA C9 F8
C3B8: 4E F0 22 A5 A8 20 18 C4 65
C3C0: 88 20 04 C4 20 18 C4 E6 16
C3C8: A7 A5 A7 C9 0B 90 D0 EE E2
C3D0: 86 02 A6 FD A5 FE 20 CD 90
C3D8: BD CE 86 02 60 8E AB C4 4D
C3E0: C8 C8 20 04 C4 E0 20 F0 4D
C3E8: E6 E0 56 D0 02 C8 C8 18 83
C3F0: 65 A8 85 A8 CE AB C4 D0 3D
C3F8: E8 A5 A8 E0 4E D0 02 A9 DB
C400: 14 4C C4 C3 B1 02 AA C9 11
C408: 56 F0 08 C9 4E F0 04 C9 2E
C410: 2D D0 02 A9 0A 29 0F 60 5C
C418: 18 65 FD 85 FD A5 FE 69 25
C420: 00 85 FE 60 A6 FB 98 F0 31
C428: 05 8A 18 65 FC AA 86 FC 60
C430: E0 0A 90 04 B9 A5 C4 60 34
C438: A5 FB 09 30 60 A0 27 20 5B
C440: D2 FF 88 10 FA 60 48 98 E7
C448: 48 A2 0F A0 0E 18 20 F0 1A
C450: FF 68 A8 68 20 1E AB A2 56
C458: 00 20 79 C3 A2 0F 20 FF 87
C460: E9 A2 C8 4C 79 C3 A2 01 E2
C468: 8E 19 D0 A0 09 AD 12 D0 1B
C470: 30 0C A2 A5 A0 0C C9 5E C9
C478: B0 04 A2 5E A0 06 8E 12 75
C480: D0 8C 21 D0 E0 A5 D0 06 2D
C488: AD A2 C4 8D 01 D0 AD 0D B7
C490: DC 29 01 F0 03 4C 31 EA F3
C498: 4C BC FE 00 01 FF 00 00 A1
C4A0: 00 00 00 00 00 D6 CE 03 49
C4A8: 0D 0E 07 00 5F 6F 7F 8F A8
C4B0: F2 42 92 E2 04 05 05 05 6E
C4B8: 06 08 0A 0C C3 20 B1 C2 35
C4C0: DB C2 DB C2 DB C2 B2 BD 0D
C4C8: C2 B3 C2 B3 C2 B3 C2 B2 A1
C4D0: 18 12 00 00 80 09 6A 96 85
C4D8: 08 00 00 00 0A 00 C8 00 B3
C4E0: 00 00 00 0A 00 00 1B A1 A7
C4E8: 1F 26 27 4F 28 00 50 29 46
C4F0: 51 01 79 7B 7E 7E 7B 7B 2C
C4F8: 7B 7E 7E 7E 7E 00 01 00 6F
C500: 01 00 01 00 01 50 01 50 A4
C508: 01 50 01 50 01 DA 01 DA 62
C510: 01 DA 01 52 01 FF 03 FF 43
C518: 02 EF 00 FF 00 FF 00 DF E9
C520: 00 FF 01 FF 03 A4 02 EC B7
C528: 02 EC 02 EC 02 A0 02 A0 4B
C530: 02 A0 02 A0 02 00 02 00 79
C538: 02 00 02 00 02 90 50 4C 6B
C540: 41 59 45 52 53 20 28 31 3F
C548: 2D 34 29 20 20 9D 00 50 01
C550: 52 45 53 53 20 41 4E 59 97
C558: 20 4B 45 59 00 31 20 45 F8
C560: 58 54 52 41 20 52 4F 4C AE
C568: 4C 20 00 20 53 20 2A 20 B2
C570: 20 2A 90 0D 00 8E 08 93 82
C578: 20 20 20 20 20 20 20 20 79
C580: 9F B0 B2 AE 20 B2 C3 AE 77
C588: 20 B2 C3 C9 20 B2 C3 C9 49
C590: 20 B2 20 B2 C3 C9 20 D5 B9
C598: C3 C9 0D 20 20 20 20 20 D3
C5A0: 20 20 20 20 C2 20 20 AB CF
C5A8: C3 20 20 C2 20 C2 20 AB 1E
C5B0: C3 CB 20 C2 20 C2 20 C2 E8
C5B8: 20 CA C3 C9 0D 20 20 20 9E
C5C0: 20 20 20 20 20 20 B1 20 53
C5C8: 20 B1 C3 BD 20 BD 20 AD C7
C5D0: 20 B1 20 20 20 B1 20 BD 92
C5D8: 20 AD 20 CA C3 CB 0D 00 2E
C5E0: 01 50 00 05 FC 00 05 FF 39
C5E8: 00 0F FC 00 03 F0 00 2A 13
C5F0: C0 00 AA 80 02 8A 80 02 EB
C5F8: 8A 80 00 AA 80 00 2D 40 9C
C600: 00 0D 40 00 05 00 00 05 57
C608: 00 00 05 00 00 05 00 00 12
C610: 05 00 00 05 00 00 0A 00 24
C618: 00 05 40 00 00 00 26 00 83
C620: 00 00 00 00 00 00 00 00 20
C628: 00 01 50 00 05 FC 00 05 80
C630: FF 00 0F FC 00 03 F0 00 30
C638: 0A C0 00 2A 80 00 2A 80 58
C640: 00 29 80 00 29 80 00 1A AD
C648: 40 00 16 B0 00 15 BC 06 27
C650: 55 50 06 54 50 04 00 A0 45
C658: 04 00 54 00 00 00 00 00 B0
C660: 00 00 00 00 00 00 05 40 A5
C668: 00 17 F0 00 17 FC 00 3F C3
C670: F0 00 0F C0 0A AB 00 2A 11
C678: AA 00 38 2A 00 1C 2A B0 7C
C680: 54 2A 00 54 2A 00 54 15 E6
C688: 40 10 15 50 00 55 50 06 E9
C690: 54 50 06 50 50 04 00 A0 80
C698: 04 00 54 00 00 00 00 00 F0
C6A0: 00 00 00 54 00 01 7F 00 75
C6A8: 01 7F C0 03 FF 00 00 FC E9
C6B0: 00 02 B0 00 0A A0 00 0A 18
C6B8: A0 00 0A 60 00 0A 60 40 6E
C6C0: 06 9D 50 05 AF 50 01 55 10
C6C8: 50 01 54 40 19 54 00 19 35
C6D0: 54 00 10 14 00 10 28 00 81
C6D8: 00 15 00 00 00 00 00 05 F2
C6E0: 40 00 17 F0 00 17 FC 00 3D
C6E8: 3F F0 00 0F C0 00 2B 01 15
C6F0: 00 AA 05 40 A6 F5 40 A5 63
C6F8: F5 40 AA 81 00 55 00 00 B0
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 119 and 120 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C700: 55 00 00 54 00 00 14 00 BD
C708: 00 14 00 00 14 00 00 14 44
C710: 00 00 14 00 00 28 00 00 4C
C718: 15 00 00 00 00 00 00 2D
```

TONS OF DATA
FROM PAGE 20

DATAWRITER (C-128)

```
·1 REM                                          JD
·2 REM            DATAWRITER                    JP
·3 REM         RUPERT REPORT #35                ON
·4 REM                                          JD
·5 REM       *** C-128 VERSION ***              MN
·6 REM                                          JD
·7 REM ================================         IO
·10 EE$=CHR$(27)+"J"+CHR$(27)+"Q"   :REM
  LINE ERASER                                   CB
·20 F$="TIME1"   :REM  DEFAULT FILENAME         HK
·30 DOPEN#8,(F$),W                              MG
·40 DD=DS : IF DD<>0 THEN GOTO 1000             LJ
·50 REM ********************************        DD
·60 REM   THIS LOOP GENERATES THE DATA          KI
·70 REM      AND WRITES IT TO DISK              JH
·80 REM --------------------------------        DD
·90 FOR N=1 TO 100                              PA
·100 T2=TI[UPARROW]2                            LA
·110 PRINT#8,T2                                 IM
·120 SS=ST: IF SS<>0 THEN 1000                  IG
·130 PRINT EE$;N; :REM SHOW ACTIVITY            FO
·140 NEXT                                       IA
·150 REM --------------------------------       DD
·160 REM             END OF LOOP                DL
·170 REM ********************************       DD
·180 DCLOSE                                     AM
·190 END                                        IC
·1000 REM  -- ERROR HANDLER --                  JB
·1010 DCLOSE : IF DD=63 THEN 1030               PP
·1020 PRINT :PRINT DS$ :PRINT "I/O STATUS
  ERROR # ";SS : END                            MB
·1030 PRINT "FILE "F$" EXISTS."                 AC
·1040 A$="" : INPUT "DO YOU WANT TO WRITE
  OVER IT (Y/N) (RETURN TO EXIT)";A$            GJ
·1050 IF A$="" THEN END                         BA
·1060 IF A$="Y" THEN SCRATCH(F$) :GOTO 30       LL
·1070 IF A$<>"N" THEN 1040                      EE
·1080 INPUT"WHAT FILENAME DO YOU WANT";F$       BC
·1090 GOTO 30                                   OJ
```

DATAREADER (C-128)

```
·1 REM                                          JD
·2 REM            DATAREADER                    IJ
·3 REM         RUPERT REPORT #35                ON
·4 REM                                          JD
·5 REM       *** C-128 VERSION ***              MN
·6 REM                                          JD
·7 REM ================================         OM
·200 F$="XX"  :REM  PUT DEFAULT NAME HERE       FN
·210 DOPEN#8,(F$)                               DM
·220 DD=DS : IF DD<>0 THEN GOTO 2000            LE
·230 REM ********************************       DD
·240 REM      THIS LOOP READS DATA              GK
·250 REM       AND MANIPULATES IT               GG
·260 REM --------------------------------       DD
·270 DO                                         OP
·280 :N=N+1 : D0=D                              BA
·290 :INPUT#8,D                                 GI
·300 :SS=ST:IF SS<>64 AND SS<>0 THEN 2000       LE
·310 :PRINT N,D,D-D0                            BC
·320 LOOP UNTIL SS=64                           LL
·330 REM --------------------------------       DD
·340 REM          END OF LOOP                   DL
·350 REM ********************************       DD
·360 DCLOSE                                     AM
·370 END                                        IC
·2000 REM   --- ERROR HANDLER ---               OI
·2010 DCLOSE : IF DD=62 THEN 2030               NN
·2020 PRINT :PRINT DS$ :PRINT "I/O STATUS
  ERROR # ";SS : END                            MB
·2030 PRINT "FILE  "F$"  DOES NOT EXIST."       EI
·2040 F$="":INPUT"WHAT FILENAME DO YOU WA
 NT (D FOR DIRECTORY; RETURN TO QUIT)";F$       EG
·2050 IF F$="" THEN END                         CF
·2060 IF F$="D" THEN DIRECTORY :GOTO 2040       HC
·2070 GOTO 210                                  BP
```

DATAWRITER (C-64)

```
·1 REM                                          JD
·2 REM          DATAWRITER - 64                 DP
·3 REM         RUPERT REPORT #35                ON
·4 REM                                          JD
·5 REM       *** C-64  VERSION ***              IJ
·6 REM                                          JD
·7 REM ================================         IO
·20 F$="TIME1"   :REM  DEFAULT FILENAME         HK
·30 OPEN15,8,15:OPEN8,8,8,F$+",W"               BI
·40 INPUT#15,DS,DS$ :DD=DS :IF DD<>0 THEN
  GOTO 1000                                     MB
·50 REM ********************************       DD
·60 REM   THIS LOOP GENERATES THE DATA          KI
·70 REM      AND WRITES IT TO DISK              JH
·80 REM --------------------------------        DD
·90 FOR N=1 TO 100                              PA
·100 T2=TI[UPARROW]2                            LA
·110 PRINT#8,T2                                 IM
·120 SS=ST: IF SS<>0 THEN 1000                  IG
·130 PRINT N; :REM SHOW ACTIVITY                NL
·140 NEXT                                       IA
```

```
•150 REM ------------------------------ DD
•160 REM            END OF LOOP          DL
•170 REM ****************************** DD
•180 CLOSE8:CLOSE15                      BG
•190 END                                 IC
•1000 REM      -- ERROR HANDLER --       JB
•1010 CLOSE8 :CLOSE15 :IF DD=63 THEN 1030 BB
•1020 PRINT :PRINT DS$ :PRINT "I/O STATUS
  ERROR # ";SS : END                     MB
•1030 PRINT "FILE "F$" EXISTS."          AC
•1040 A$="" : INPUT "DO YOU WANT TO WRITE
  OVER IT (Y/N) (RETURN TO EXIT)";A$     GJ
•1050 IF A$="" THEN END                  BA
•1060 IF A$="Y" THEN OPEN15,8,15,"S:"+F$:
 CLOSE15 : GOTO 30                       KH
•1070 IF A$<>"N" THEN 1040               EE
•1080 INPUT"WHAT FILENAME DO YOU WANT";F$ BC
•1090 GOTO 30                            OJ
```

DATAREADER (C-64)

```
•1 REM                                   JD
•2 REM         DATAREADER - 64           DB
•3 REM        RUPERT REPORT #35          ON
•4 REM                                   JD
•5 REM      *** C-64  VERSION ***        IJ
•6 REM                                   JD
•7 REM ================================= OM
•200 F$="XX"                             BH
•210 OPEN15,8,15 : OPEN8,8,8,F$          LG
•220 INPUT#15,DS,DS$ :DD=DS:IF DD<>0 THEN
  GOTO 2000                              MK
•230 REM ****************************** DD
•240 REM      THIS LOOP READS DATA       GK
•250 REM       AND MANIPULATES IT        GG
•260 REM ------------------------------ DD
•270 REM                                 JD
•280 :N=N+1 : D0=D                       BA
•290 :INPUT#8,D                          GI
•300 :SS=ST:IF SS<>64 AND SS<>0 THEN 2000 LE
•310 :PRINT N,D,D-D0                     BC
•320 IF SS<>64 THEN 280                  GL
•330 REM ------------------------------ DD
•340 REM          END OF LOOP            DL
•350 REM ****************************** DD
•360 CLOSE8 : CLOSE15                    BG
•370 END                                 IC
•2000 REM     --- ERROR HANDLER ---      OI
•2010 CLOSE8 :CLOSE15 :IF DD=62 THEN 2030 AP
•2020 PRINT :PRINT DS$ :PRINT "I/O STATUS
  ERROR # ";SS : END                     MB
•2030 PRINT "FILE "F$" DOES NOT EXIST." :
  F$=""                                  GM
•2040 INPUT"WHAT FILENAME DO YOU WANT (RE
 TURN TO QUIT)";F$                       OI
•2050 IF F$="" THEN END                  CF
•2060 GOTO 210                           BP
```

SYNTAX PATROL
FROM PAGE 52

Starting address in hex: C738
Ending address in hex: CC27
SYS to start: 51000

***Flankspeed* required for entry! See page 121.**

```
C738: A9 C9 CD 03 03 D0 48 AD 46
C740: BD CB D0 23 A2 05 BD B6 D9
C748: CB 9D 68 C0 CA 10 F7 A9 57
C750: AD A2 4C A0 93 8D 00 C0 6F
C758: 8E AA C0 8E FB C0 8C 7C A6
C760: C1 20 6E C7 4C 68 C1 A9 98
C768: 83 A2 A4 20 90 CB 20 56 26
C770: CA A9 8B A2 E3 A0 03 4C E6
C778: 97 CB B9 BD CB F0 07 20 37
C780: D2 FF C8 4C 7A C7 60 20 2B
C788: 44 E5 A2 01 A0 0E 18 20 3D
C790: F0 FF A0 01 20 7A C7 20 A5
C798: E4 FF C9 4E D0 11 8D BD C2
C7A0: CB 20 A7 C7 4C F4 C7 20 25
C7A8: D2 FF A0 3B 4C 7A C7 C9 AF
C7B0: 59 D0 E4 20 A7 C7 8D BD 9A
C7B8: CB A2 04 A0 3F BD B0 CB 45
C7C0: DD 47 C0 D0 B5 CA 10 F5 FD
C7C8: A9 EA A2 02 9D 19 C0 9D 17
C7D0: 68 C0 9D 6B C0 9D 0F C1 32
C7D8: 9D 12 C1 CA 10 EE A9 60 1E
C7E0: 8D 00 C0 8D AA C0 8D FB B1
C7E8: C0 A9 0D 8D 7C C1 20 0F 5B
C7F0: C0 20 7A CA A9 A0 A2 00 04
C7F8: A0 E0 85 FC 86 FB 86 FD 04
C800: 84 FE A1 FB 81 FB A1 FD 3E
C808: 81 FD E6 FB E6 FD D0 F2 13
C810: E6 FC E6 FE D0 EC A9 4C 8D
C818: 8D 96 A4 8D 9C A4 8D 49 86
C820: A7 8D 5D A7 8D 78 A7 8D 95
C828: A5 A7 8D 83 A8 8D 34 A9 9A
C830: 8D 57 A9 8D A5 AB 8D CB F6
C838: AB 8D B8 AA 8D 8D AB 8D 29
C840: 1E AD 8D FC B2 8D 48 B7 D6
C848: 8D 53 B8 8D EA B9 8D 2D CE
C850: E1 8D 59 E1 8D 6F E1 8D 67
C858: C1 E1 A9 0E A2 62 A0 B3 0D
C860: 8D 31 A9 8D FD B2 8E B0 46
C868: AA 8C FE B2 A9 50 A2 CA B8
C870: 8D 97 A4 8E 98 A4 A9 18 C7
C878: A2 CA 8D 9D A4 8E 9E A4 87
C880: A9 95 A2 CA 8D A1 A8 8E 93
C888: A2 A8 A9 01 A2 CB 8D 35 AF
C890: A9 8E 36 A9 A9 85 A2 CA 45
C898: 8D 58 A9 8E 59 A9 A9 A0 04
C8A0: A2 CA 8D 1F AD 8E 20 AD C4
C8A8: A9 09 A2 CB 8D 54 B8 8E F2
C8B0: 55 B8 A9 5D A2 CB 8D EB AD
C8B8: B9 8E EC B9 A9 37 A2 CA F5
```

```
C8C0: 8D CC A7 8E CD A7 A9 72 E2
C8C8: A2 CB 8D 49 B7 8E 4A B7 56
C8D0: A9 5C A2 CB 8D A4 BF 8E C5
C8D8: A5 BF A9 60 8D 10 03 8D 76
C8E0: 44 A6 8D BB A6 8D 59 A8 4B
C8E8: 8D 7A A8 8D C0 A8 8D D4 F2
C8F0: A8 8D A6 B3 8D AE B3 8D FE
C8F8: 27 B8 8D 3C B8 8D 50 B8 F1
C900: A2 00 8E CA A7 8E 57 AC 36
C908: 8E DB AC 8E 13 BB A9 45 6B
C910: 8D A1 AA A9 9D A2 AA 8D 0C
C918: B9 AA 8D 9B AC 8E BA AA 46
C920: A9 AE A2 A7 8D A6 A7 8D 2C
C928: 52 A8 8D 55 A8 8E 4B A7 30
C930: 8E 5F A7 8E 7A A7 8E A7 AC
C938: A7 8E 53 A8 8E 56 A8 A9 A1
C940: 5A A2 6D A0 92 8D 4A A7 5D
C948: 8E 5E A7 8C 79 A7 A9 A0 D4
C950: A2 A8 8D 84 A8 8E 85 A8 13
C958: A9 0F A2 B0 A0 0D 8D FF 9F
C960: B2 8E 00 B3 8C 01 B3 A9 40
C968: 85 A2 AB 8D A6 AB 8E A7 52
C970: AB A9 08 8D C2 AB A9 0B 7E
C978: A2 06 A0 AC 8D 81 AB 8E B7
C980: CC AB 8E 8E AB 8C 8F AB 89
C988: 8C CD AB 8C 9C AC A9 EA F8
C990: 9D 90 AA 9D A8 AB 9D AD A6
C998: AB 9D B3 AB CA 10 F1 8D 9B
C9A0: 4E A9 8D 11 AB 8D 12 AB 2E
C9A8: 8D 7B AB 8D 7C AB 8D 7D 1E
C9B0: AB 8D 56 B8 A9 F0 A2 03 39
C9B8: A0 05 8D D0 B4 8E D1 B4 86
C9C0: 8C 8F B7 A9 E7 A2 FF 8D 56
C9C8: 5A E1 8D 70 E1 8D C2 E1 17
C9D0: 8E 5B E1 8E 71 E1 8E C3 D0
C9D8: E1 A9 FE A2 C9 20 90 CB 4C
C9E0: A9 E9 A2 C9 A0 00 4C 97 65
C9E8: CB AD 00 02 C9 B2 F0 03 D4
C9F0: 4C 8B E3 20 61 CA A0 00 99
C9F8: 20 9D CB 4C 74 A4 20 56 5E
CA00: CA A5 2D A6 2E 85 2F 85 AC
CA08: 31 86 30 86 32 20 61 CA F4
CA10: A9 35 20 58 CA 4C 83 A4 A6
CA18: C9 30 90 0A C9 3A B0 06 67
CA20: 20 73 00 4C 18 CA A2 58 DD
CA28: BD 00 02 9D 22 CC CA 10 4F
CA30: F7 20 79 A5 4C E1 A7 20 5D
CA38: 56 CA A9 00 A2 58 A0 02 A0
CA40: 85 7A 84 7B BD 22 CC 9D 8A
CA48: 00 02 CA 10 F7 4C 9C A4 AA
CA50: 20 56 CA 4C 96 A4 A9 37 F9
CA58: A2 2F 78 85 01 86 00 58 08
CA60: 60 AD BD CB D0 FA 20 6F 53
CA68: CA 20 6F C0 4C 7A CA A2 B7
CA70: 03 BD 19 CC 95 FB CA 10 83
CA78: F8 60 A2 03 B5 FB 9D 19 DF
CA80: CC CA 10 F8 60 20 73 00 15
CA88: 20 95 CA 20 C7 CA C9 2C B1
CA90: D0 41 4C 85 CA C9 30 90 C9
CA98: 38 C9 3A B0 34 4C 6B A9 1B
CAA0: 20 C7 CA C9 41 90 2C C9 E4
CAA8: 5B B0 28 20 73 00 F0 28 89
CAB0: C9 2C D0 06 20 73 00 4C 5D
CAB8: A3 CA C9 30 90 15 C9 3A CA
CAC0: F0 16 90 E7 4C A3 CA 20 1B
CAC8: 79 00 F0 0A C9 3A F0 06 38
CAD0: 60 68 68 4C 08 AF 68 68 D6
CAD8: 4C AE A7 85 FD 86 FE A6 2B
CAE0: 7A E8 CA 30 EC BD 00 02 EB
CAE8: C5 FD D0 F6 E8 30 E2 BD 2E
CAF0: 00 02 C5 FE D0 F6 E8 30 98
CAF8: D8 BD 00 02 C9 20 F0 F6 63
CB00: 60 20 FF AE F0 CD 4C 40 7A
CB08: A9 A5 6A F0 23 C9 81 B0 D1
CB10: 1F A5 69 D0 1B A5 62 F0 23
CB18: 08 C9 81 B0 0B A5 61 D0 FE
CB20: 07 A9 88 85 69 4C 30 CB 90
CB28: A5 61 85 69 A5 62 85 6A 16
CB30: A5 66 49 FF 4C 57 B8 8E 70
CB38: 1F CC 20 DB CA 4C 43 CB 46
CB40: 20 F6 CA C9 00 F0 15 C9 BB
CB48: 30 90 F5 C9 3B 90 0D C9 6B
CB50: 41 90 ED C9 5B B0 E9 A9 79
CB58: 00 8D 1F CC 60 A9 BC A2 3B
CB60: 28 20 37 CB AD 1F CC D0 16
CB68: 03 4C F4 B9 20 2B BC 4C BA
CB70: ED B9 20 61 B7 86 FB 84 58
CB78: FC A9 CA A2 2C 20 37 CB DB
CB80: A6 FB A4 FC AD 1F CC D0 2F
CB88: 03 4C 4D B7 8A 4C 4B B7 B6
CB90: 8D 02 03 8E 03 03 60 8D A5
CB98: 00 03 8E 01 03 B9 A9 CB 5D
CBA0: F0 06 20 D2 FF C8 D0 F5 1A
CBA8: 60 4F 4E 00 4F 46 46 00 82
CBB0: 84 FE 20 0A C1 00 8D 02 AF
CBB8: 03 8E 03 03 00 4E 12 53 04
CBC0: 59 4E 54 41 58 20 50 41 08
CBC8: 54 52 4F 4C 0D 0D 44 4F B8
CBD0: 20 59 4F 55 20 57 41 4E F5
CBD8: 54 20 54 4F 20 55 53 45 FE
CBE0: 0D 0D 46 41 49 4C 53 41 AC
CBE8: 46 45 2C 20 54 4F 4F 3F F2
CBF0: 20 28 59 2F 4E 29 20 00 59
CBF8: 0D 0D 00 11 11 11 50 4C E2
CC00: 45 41 53 45 20 4C 4F 41 1C
CC08: 44 20 46 41 49 4C 53 41 1E
CC10: 46 45 2E 2E 2E 11 0D 00 44
CC18: 41 48 4F 59 21 21 21 00 AD
CC20: 00 00 00 00 00 00 00 00 20
```

All programs in this issue of *Ahoy!* are available on disk. See page 93 for details.

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 119 and 120 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

TELEPORTER
FROM PAGE 35

```
•10 REM ************************** CE
•15 REM *      TELEPORTER        * PB
•20 REM *BY CLEVELAND M. BLAKEMORE* PF
•25 REM ************************** CE
•30 POKE53281,.:POKE53280,12:DIM A(63,2),
 S$(48) FN
•35 VI=5:K=.:F=.:NB=.:NT=.:W=.:W$="":I$="
 [WHITE]":C$=I$:D$=I$:C=.:CL=.:SB=.:SC=.:
 L=. DC
•40 X$="[BLACK]":R$="[RVSON]" LJ
•45 X=RND(-TI/37):PLOT=65520:PRINT"[CLEAR
 ][BLUE][3"[RIGHT]"] PLEASE WAIT[3"."]INI
 TIALIZING GAME." OI
•50 S$(.)="[c 8][RVSOFF]&[RVSON]CAPTAIN:[
 30" "]":S$(1)=" STAND BY [5"."]" LP
•55 S$(2)="PREPARE FOR ":S$(3)="KRELL":S$
 (4)="ALGON":S$(5)="BETA IV":S$(6)="CETA PD
•60 S$(7)="ALPHAN":S$(8)="SOL":S$(9)="TIR
 US":S$(10)="AMBASSADOR":S$(11)="TRADER CE
•65 S$(12)="CREWMEMBER":S$(13)="PILOT":S$
 (14)="ENGINEER":S$(15)="INSPECTOR PP
•70 S$(16)="OFFICER":S$(17)="PASSING THRU
  RADIATION STORM" BI
•75 S$(18)=" $%&# COMPUTER ON THE FRITZ !
 ":S$(19)="TRANSMISSION GARBLED!" AE
•80 S$(20)="PHONY[3"."]":S$(21)="WE TRY T
 O CONSERVE ENERGY HERE":S$(22)="LUNCHTIM
 E BB
•85 S$(23)="METEOR BELT-TURBULENCE AHEAD"
 :S$(24)="ANOTHER ALIEN FREELOADER." OB
•90 S$(25)="YOU JUST FRIED THE ":S$(26)="
 YOU'RE FIRED!GET OFF MY SHIP!" CA
•95 S$(27)="GOOD JOB." LE
•100 FORX=.TO10:READA$:S$(28+X)=A$:NEXT FP
•105 FORX=.TO9:READA$:S$(39+X)=A$:NEXT BA
•110 FORX=.TO32:READA:POKE679+X,A:NEXT JK
•115 POKE56334,PEEK(56334)AND254 DN
•120 POKE1,PEEK(1)AND251:SYS679:POKE1,PEE
 K(1)OR4:POKE56334,PEEK(56334)OR1 GD
•125 READA:IFA=-1THEN135 KJ
•130 FORX=.TO7:READD:POKE61440+A*8+X,D:NE
 XT:GOTO125 DE
•135 POKE648,192:PRINT"[CLEAR][3"[DOWN]"]
 [RIGHT][RIGHT][RVSON] WELCOME ABOARD THE
  U.S.S. NEFARIUS !" AN
•140 POKE56576,PEEK(56576)AND252:POKE5327
 2,12:V=53248:POKEV+21,. ID
•145 D=49152:FORX=.TO319:READA:POKED+20*6
 4+X,A:NEXT:POKEV,92:POKEV+1,208 ND
•150 POKEV+8,240:POKEV+9,210:POKEV+23,27:
 POKEV+43,14 PD
•155 POKEV+27,23:POKEV+28,12:POKEV+29,27:
 FORX=.TO48:POKED+25*64+X,255:NEXT NI
•160 FORX=48TO63:POKED+25*64+X,.:NEXT GH
•165 FORX=.TO63:POKED+26*64+X,255:NEXT GA
•170 POKEV+4,250:POKEV+5,216:POKED+1016,2
 0:POKED+1017,26:POKED+1018,24 EH
•175 POKED+1019,24:POKEV+6,159:POKEV+7,13
 3:POKEV+39,11:POKEV+40,PEEK(V+33) LN
•180 A=780:X=781:Y=782:P=783:POKEV+2,159:
 GOSUB380 IM
•185 POKEV+3,133:S=54272:FORSC=STOS+24:PO
 KESC,.:NEXT KP
•190 GOSUB510:PRINTS$(.); EE
•195 POKES+1,34:POKES,10:POKES+5,129:POKE
 S+6,129:POKES+24,10:POKES+4,129 FH
•200 POKEV+21,27:FORSC=26TO255:POKED+1016
 ,SC:POKED+1020,SC:NEXT:GOSUB550 PH
•205 POKED+1020,25:POKED+1016,20:POKES+4,
 .:GOSUB510:PRINTTAB(9)S$(1); CI
•210 F=.:GOSUB640:R%=22+RND(0)*3:IFRND(1)
 >.5THENF=1 BF
•215 NB=INT(RND(1)*45+50):NT=INT(RND(1)*3
 0+65) LI
•220 NB=NB+INT(RND(1)*10)/10:NT=NT+INT(RN
 D(1)*10)/10:POKED+1018,R% BK
•225 POKED+1019,R%:IFFANDRND(1)*7>LTHENPO
 KED+1019,22+INT(RND(0)*3) BL
•230 GOSUB550 CO
•235 N$=S$(3+(RND(1)*7)):T$=S$(10+(RND(1)
 *7)):N$=N$+CHR$(32)+T$ FO
•240 GOSUB510:PRINTTAB(9);CHR$(18);S$(2);
 N$;CHR$(19):GOSUB550 LM
•245 POKEX,20:POKEY,16:POKEP,.:SYSPLOT:PR
 INTI$;MID$(STR$(NB)+".0",2,4); MG
•250 POKEX,22:POKEY,16:POKEP,.:SYSPLOT:PR
 INTMID$(STR$(NT)+".0",2,4); NE
•255 POKED+1016,21:POKEV+37,RND(0)*10:POK
 EV+38,RND(0)*10:POKEV+41,RND(0)*10 PD
•260 POKEV+42,PEEK(V+41):IFFANDRND(1)*12>
 LTHENPOKEV+42,RND(0)*10 AA
•265 POKEV+21,PEEK(V+21)OR4 LH
•270 W=INT(RND(0)*5)*2:W$=S$(39+W) LE
•275 POKEX,20:POKEY,23:POKEP,.:SYSPLOT:PR
 INTW$;:GOSUB550 GL
•280 GOSUB640:IFL>12THENGOSUB565 DJ
•285 GOSUB550:FORSC=STOS+24:POKESC,.:NEXT
 :POKES,.:POKES+5,8 EJ
•290 POKES+6,123:POKES+24,15:POKES+4,21:S
 C=133 BB
•295 FORIR=.TO1:F1=PEEK(V+3):POKES+15,F1*
 .1:POKES+1,F1*.01 EH
•300 EC=(INT(RND(1)*VI)+INT(RND(1)*8*F))*
 .1:VI=-VI HE
•305 POKEX,20:POKEY,16:POKEP,.:SYSPLOT:PR
 INTC$;MID$(STR$(NB+EC)+".0",2,4); DP
•310 PRINT"[DOWN][DOWN][4"[LEFT]"]";MID$(
 STR$(NT+EC)+".0",2,4); JK
```

```
·315 IFSBTHENPOKEV+22,(PEEK(V+22)AND248)O
 RRND(1)*8                                  NK
·320 POKEX,22:POKEY,23:POKEP,.:SYSPLOT:PR
 INTD$;S$(39.6+W+ABS(EC)):NEXT              LG
·325 POKED+1016,21.5-ABS(EC)-(RND(1)*.1)    PI
·330 IFPEEK(56321)=239THEN615               CI
·335 SC=SC-1:POKEV+3,SC:IFSC>90THEN295      EC
·340 POKEV+22,(PEEK(V+22)AND248):POKES+4,
 .                                          MI
·345 GOSUB510:PRINTS$(.);:GOSUB510          JA
·350 IFFTHENPRINTTAB(9)S$(24);:POKED+1016
 ,20:K=K+1:GOSUB640:GOSUB520:GOTO360        LM
·355 GOSUB550:PRINTTAB(9)S$(27);:POKED+10
 16,21                                      HE
·360 L=L+1:GOSUB640:C$=I$:D$=I$:POKEV+21,
 27:SB=.                                    OI
·365 IFL<21THENGOSUB550:GOTO185             DD
·370 IFK>6THENGOSUB510:PRINTS$(.);:GOSUB5
 10:PRINTTAB(9);S$(26);                     LF
·375 GOTO650                                CH
·380 PRINT"[CLEAR]"TAB(8)"[c 5][s M][22"[
 c @]"][s N]                                KL
·385 PRINTTAB(9)"[s T] [RVSON][sEP][3" "]
 TELEPORTER[3" "][c *][RVSOFF] [s Y]        NA
·390 PRINTTAB(9)"[s T][RVSON][sEP][18"[c
 @]"][c *][RVSOFF][s Y]                     CO
·395 PRINTTAB(9)"[s T][RVSON][20"[s V]"][
 RVSOFF][s Y]                               EI
·400 PRINTTAB(9)"[s T][4" "][s T][RVSON][
 10"[c T]"][RVSOFF][s Y][4" "][s Y]         BF
·405 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [8"[s W]"] [RVSOFF][s Y][4" "][s Y]        CI
·410 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [s W][6" "][s W] [RVSOFF][s Y][4" "][s Y
 ]                                          IF
·415 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [s W]  [sEP][c *]  [s W] [RVSOFF][s Y][4
 " "][s Y]                                  BO
·420 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [s W] [sEP]  [c *] [s W] [RVSOFF][s Y][4
 " "][s Y]                                  ND
·425 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [s W] [c *]  [sEP] [s W] [RVSOFF][s Y][4
 " "][s Y]                                  PC
·430 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [s W]  [c *][sEP]  [s W] [RVSOFF][s Y][4
 " "][s Y]                                  ND
·435 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [s W][6" "][s W] [RVSOFF][s Y][4" "][s Y
 ]                                          FN
·440 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [8"[s W]"] [RVSOFF][s Y][4" "][s Y]        OF
·445 PRINTTAB(9)"[s T][4" "][s T][RVSON]
 [9"[c @]"][RVSOFF][s Y][4" "][s Y]         KK
·450 PRINTTAB(8)"[s N][3"[c Y]"][RVSON][s
 EP][s N] [s N][s O][6"[c Y]"][s P][s M]
 [s M][c *][RVSOFF][3"[c Y]"][s M]          PB
·455 PRINTTAB(7)"[s N][3" "][RVSON][sEP][
 s N][c @][s N][RVSOFF][sEP][8" "][c *][R
 VSON][s M][c @][s M][c *][RVSOFF][3" "][
 s M]                                       FH
·460 PRINTTAB(6)"[s N][3" "][RVSON][sEP][
 18"[c @]"][c *][RVSOFF][3" "][s M]         EC
·465 PRINTTAB(5)"[s N][4" "][RVSON][20"[s
  V]"][RVSOFF][4" "][s M]                   OG
·470 PRINTTAB(4)"[s N]"SPC(30)"[s M]"       OG
·475 PRINTTAB(3)"[s N]  [RVSON][sEP][c G]
 [c A]HELM[s C][c R][5"[s C]"][c R][5"[s
 C]"][c R]IMAGE[s C][c M][c *][RVSOFF] [s
  M]                                        DA
·480 PRINTTAB(2)"[s N]  [RVSON][sEP][s Q]
 [c G][s B][RVSOFF][5" "][RVSON][s B][c 6
 ]B[RVSOFF][c 5][4" "][RVSON][s B][c 6]R[
 BACKARROW][RVSOFF][c 5][3" "][RVSON][s B
 ][RVSOFF][6" "][RVSON][c M][s Q][c *][RV
 SOFF] [s M]                                LK
·485 PRINT" [s N]  [RVSON][sEP][s Q] [c G
 ][s B][RVSOFF][5" "][RVSON][s B][c 6] [R
 VSOFF][c 5][4" "][RVSON][s B][c 6]  [RVS
 OFF][c 5][3" "][RVSON][s B][RVSOFF][6" "
 ][RVSON][c M] [s Q][c *][RVSOFF] [s M]     IH
·490 PRINT"[s N]  [RVSON][sEP][s W]  [c G
 ][s B][RVSOFF][5" "][RVSON][s B][c 6]T[R
 VSOFF][c 5][4" "][RVSON][s B][c 6]W[BACK
 ARROW][RVSOFF][c 5][3" "][RVSON][s B][RV
 SOFF][6" "][RVSON][c M]  [s W][c *][RVSO
 FF] [s M]";                                OA
·495 PRINT"  [RVSON][sEP][s Q][3" "][c G]
 [s B][RVSOFF][5" "][RVSON][s B][c 6] [RV
 SOFF][c 5][4" "][RVSON][s B][c 6]  [RVSO
 FF][c 5][3" "][RVSON][s B][RVSOFF][6" "]
 [RVSON][c M][3" "][s Q][c *][RVSOFF] ";S
 $(0);                                      NK
·500 PRINTCHR$(157);CHR$(148);CHR$(32);CH
 R$(19);:RETURN                             FA
·505 REM SET CURSOR                         KC
·510 POKEP,.:POKEY,.:POKEX,24:SYSPLOT:RET
 URN                                        KI
·515 REM ABORT/FRY ALIEN                    BM
·520 FORSC=STOS+24:POKESC,.:NEXT:POKES+1,
 10:POKES+5,75:POKES+6,30:POKES,25          CK
·525 POKES+24,15:POKES+4,23:POKEV+3,90      ON
·530 GOSUB510:PRINTS$(.);:GOSUB510:PRINTT
 AB(9)"[RVSON][c 8][s +] [s +] [s +] [s +
 ] [s +] ABORT ! [s +] [s +] [s +] [s +][
 HOME]";                                    II
·535 FORSC=.TO64:PRINTCHR$(14);:POKEV+33,
 SC:PRINTCHR$(142);:POKES+15,SC:NEXT        BM
·540 POKEV+3,133:POKES+4,.:GOSUB550:GOSUB
 640:GOSUB510:PRINTS$(.);:RETURN            KP
·545 REM BEEP                               NA
·550 FORSC=STOS+24:POKESC,.:NEXT:POKES+24
 ,15                                        HB
·555 POKES+1,25:POKES,5:POKES+5,20:POKES+
 6,20:POKES+4,33:FORSC=.TO75:NEXT           FI
·560 POKES+4,.:RETURN                       PF
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 119 and 120 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
·565 GOSUB510:PRINTS$(.);:GOSUB510:PRINTT
 AB(9);                                    IG
·570 ONL-12GOSUB580,605,580,585,590,595,6
 00,605                                    CH
·575 GOSUB640:GOSUB510:PRINTS$(.);:RETURN IF
·580 C$=X$:PRINTS$(18);:RETURN             OP
·585 POKEV+21,30:PRINTS$(22);:RETURN       IE
·590 D$=X$:SB=1:PRINTS$(17);:RETURN        HI
·595 POKED+1018,RND(0)*3+22:PRINTS$(19);:
 RETURN                                    LH
·600 C$=X$:D$=X$:PRINTS$(21);:RETURN       GA
·605 SB=1:D$=X$:PRINTS$(23);:RETURN        AL
·610 REM CHECK FOR CORRECT ABORT           PM
·615 POKEV+22,PEEK(V+22)AND248             AB
·620 GOSUB520:GOSUB510:IFFTHENPRINTTAB(9)
 S$(20);:GOSUB510:GOTO355                  IP
·625 GOSUB510:PRINTS$(.);:GOSUB510:PRINTT
 AB(9)S$(25);T$;"!";:K=K+1:GOSUB510        KA
·630 POKED+1016,20:GOSUB640:GOTO360        NF
·635 REM DELAY                             DG
·640 FORSC=.TO3000:NEXT:RETURN             BI
·645 REM RATE PERFORMANCE                  FD
·650 GOSUB550:GOSUB640:GOSUB550            BB
·655 GOSUB510:PRINTS$(.);:GOSUB510:PRINTT
 AB(9)R$;"RATING[s C][s C]>";              CD
·660 FORX=.TO10:IFX*2=20-KORX*2+1=20-KTHE
 NPRINTS$(28+X);:GOSUB550                  AN
·665 NEXT:GOSUB640:GOSUB640:GOSUB550       IC
·670 POKE648,4:POKE679,.:SYS679            BK
·675 REM RATINGS                           MI
·680 DATA RAW RECRUIT,SPACE CADET,ENSIGN,
 SPECIALIST,LIEUTENANT,1ST LIEUTENANT      DB
·685 DATA CAPTAIN,MAJOR,ADMIRAL,GALACTIC
 WHIZ KID,REGULAR RICKY ROCKET             CH
·690 REN WAVEFORM DATA                     LG
·695 DATA $$$,%%%,%$$,$%$,*(*,(*(,)(),()(
 ,$%%,%$$                                  FJ
·700 REM ML COPYDOWN ROUTINE               AK
·705 DATA 169,,133,251,133,253,169,208,13
 3,252,169,240,133,254,162,8               FE
·710 DATA 160,,177,251,145,253,136,208,24
 9,230,252,230,254,202,208,240,96          MA
·715 REM CHARACTER DATA                    KP
·720 DATA036,000,004,010,017,160,064,000,
 000                                       ML
·725 DATA037,000,032,080,136,005,002,000,
 000                                       IK
·730 DATA038,239,199,147,147,131,131,147,
 187                                       BM
·735 DATA040,000,056,040,040,239,000,000,
 000                                       AF
·740 DATA041,000,000,000,000,251,010,010,
 014                                       PG
·745 DATA042,000,016,040,040,199,000,000,
 000,-1                                    AK
·750 REM SPRITE DATA                       MM
·755 DATA255,255,255,135,255,193,143,254   BN
·760 DATA225,143,252,097,132,000,065,133   PO
·765 DATA147,065,132,214,065,134,016,193   GB
·770 DATA132,040,065,132,000,065,186,124   FC
·775 DATA189,197,069,067,130,130,129,129   FB
·780 DATA125,033,128,130,113,128,124,113   PD
·785 DATA128,000,081,128,000,001,128,000   NF
·790 DATA001,128,000,001,255,255,255,060   KP
·795 DATA255,255,255,135,255,193,143,254   BN
·800 DATA225,143,252,097,132,000,065,132   PP
·805 DATA214,065,132,016,065,134,016,193   EK
·810 DATA132,040,065,132,130,065,186,068   PJ
·815 DATA189,197,057,067,130,130,129,129   PC
·820 DATA125,033,128,130,113,128,124,113   PD
·825 DATA128,000,081,128,000,001,128,000   NF
·830 DATA001,128,000,001,255,255,255,060   KP
·835 DATA005,020,080,000,085,000,000,215   KE
·840 DATA000,000,125,000,000,020,000,001   NB
·845 DATA085,064,005,086,080,020,085,020   ID
·850 DATA080,085,005,064,150,001,064,170   PB
·855 DATA001,097,085,073,133,065,082,149   AG
·860 DATA000,086,020,000,020,020,000,020   MM
·865 DATA020,000,020,020,000,020,020,000   BM
·870 DATA020,028,000,052,252,000,063,044   LN
·875 DATA000,065,000,001,020,064,012,040   NN
·880 DATA048,000,020,000,000,065,000,000   EJ
·885 DATA020,000,000,020,000,001,085,064   HK
·890 DATA004,020,016,144,020,006,032,085   KA
·895 DATA008,129,020,066,004,020,016,004   ID
·900 DATA150,016,036,020,024,008,085,032   AE
·905 DATA032,085,008,001,215,064,005,085   OL
·910 DATA080,006,065,144,020,000,020,044   CG
·915 DATA000,000,000,001,065,064,007,215   ND
·920 DATA208,007,150,208,001,085,064,000   FJ
·925 DATA105,000,000,020,000,001,150,064   GP
·930 DATA005,105,080,020,105,020,016,105   PA
·935 DATA004,016,150,004,016,020,004,020   MC
·940 DATA020,020,016,020,004,004,085,016   IJ
·945 DATA000,085,000,001,065,064,005,000   NO
·950 DATA080,005,000,080,021,000,084,044   GC
```

LONG LINES
FROM PAGE 73

```
·100 REM ************************          OG
·110 REM *       LONG LINES       *        JJ
·120 REM * BY RICK NASH   5/28/86 *        EH
·130 REM ************************          OG
·140 REM                                   JD
·150 PRINTCHR$(147):PRINT:PRINTTAB(7)"-CH
 ECKING DATA STATEMENTS-"                  CG
·160 CK=0:FORI=49152TO49337:READD:POKEI,D
 :CK=CK+D:NEXT                             NE
```

```
·170 IFCK<>30183THENPRINT:PRINTTAB(8)"ERR
 OR IN DATA STATEMENTS":END                LD
·180 PRINTCHR$(147):PRINT:PRINTTAB(10)"DI
 SK OR TAPE (D/T) ";:INPUTA$               KN
·190 IFLEFT$(A$,1)="T"THENDV$="PREPARE TA
 PE":DV=1:GOTO220                          MH
·200 IFLEFT$(A$,1)="D"THENDV$="INSERT DIS
 K":DV=8:GOTO220                           EG
·210 GOTO180                               CN
·220 PRINT:PRINTTAB(4)DV$", THEN PRESS <R
 ETURN>"                                   CI
·230 GETA$:IFA$<>CHR$(13)THEN230           DG
·240 PRINT:PRINTTAB(13)"-WRITING FILE-     HJ
·250 F$="LONG LINES":POKE251,PEEK(71):POK
 E252,PEEK(72)                             HG
·260 AD=PEEK(251)+PEEK(252)*256            CC
·270 POKE183,PEEK(AD):POKE187,PEEK(AD+1):
 POKE188,PEEK(AD+2)                        BC
·280 POKE184,DV:POKE186,DV:POKE185,1       PE
·290 POKE251,0:POKE252,192:POKE780,251:PO
 KE781,186:POKE782,192:SYS65496            AF
·300 PRINTCHR$(147):PRINT:PRINTTAB(17)"DO
 NE!!":END                                 OJ
·310 DATA 169,0,168,133,251,133,253,162    FJ
·320 DATA 160,134,252,162,224,134,254,177  PB
·330 DATA 251,145,251,177,253,145,253,200  ED
·340 DATA 208,245,230,252,166,254,232,208  BI
·350 DATA 236,165,1,41,253,133,1,162       GN
·360 DATA 21,189,96,165,157,192,192,202    NO
·370 DATA 16,247,162,29,189,202,170,157    AI
·380 DATA 214,192,202,16,247,162,0,160     AN
·390 DATA 0,189,107,192,240,15,133,251     LN
·400 DATA 189,134,192,133,252,189,160,192  HB
·410 DATA 145,251,232,208,236,96,165,95    IA
·420 DATA 208,2,198,96,198,95,164,11       PF
·430 DATA 185,251,192,145,95,136,208,248   NN
·440 DATA 76,42,165,203,218,222,132,186    NL
·450 DATA 205,208,231,241,6,11,245,19      OP
·460 DATA 22,206,31,32,33,132,133,253      NE
·470 DATA 252,162,180,194,255,0,192,192    PC
·480 DATA 192,165,165,165,165,165,165,166  GB
·490 DATA 166,164,165,165,192,165,165,165  NO
·500 DATA 164,164,192,192,232,232,230,231  FH
·510 DATA 193,193,192,193,193,192,192,193  FN
·520 DATA 192,193,192,193,192,192,176,76   MA
·530 DATA 86,192,192,192,1,1,4,4           BH
·540 DATA 159,159                          BM
```

DISCS OF DAEDALUS

FROM PAGE 55

Starting address in hex: C000
Ending address in hex: CC4F
SYS to start: 49152

***Flankspeed* required for entry! See page 121.**

```
C000: A0 00 B9 1D C0 99 00 0C DD
C008: C8 C0 FF D0 F5 A0 00 B9 B2
C010: DD C0 99 C0 0C C8 C0 FF 9E
C018: D0 F5 4C 41 C3 00 00 00 30
C020: 00 00 00 00 00 00 00 00 20
C028: 00 00 00 00 00 00 00 00 28
C030: 00 00 00 00 00 00 00 00 30
C038: 00 00 00 00 00 00 00 00 38
C040: 00 04 00 20 08 7E 10 18 13
C048: FF 18 28 FF 14 08 FF 10 B4
C050: 7F 99 FE DF FF FB 7B FF BF
C058: DE 31 E7 8C 00 00 00 00 DC
C060: 00 00 00 00 00 00 00 00 60
C068: 00 00 00 00 00 00 00 00 68
C070: 00 00 00 00 00 00 00 00 70
C078: 00 00 00 00 00 00 00 00 78
C080: 00 00 01 FC 00 00 FE 00 7D
C088: 01 FE 00 70 0E 00 F8 0E 0E
C090: 0F FF FF 1F FF F7 3E 03 F7
C098: EF 7F FF FF 00 00 00 00 08
C0A0: 00 00 00 00 00 00 00 00 A0
C0A8: 00 00 00 00 00 00 00 00 A8
C0B0: 00 00 00 00 00 00 00 00 B0
C0B8: 00 00 00 00 00 00 00 00 B8
C0C0: 00 00 00 F0 00 01 FC 00 AF
C0C8: 00 F0 00 00 00 00 00 00 B9
C0D0: 00 00 00 00 00 00 00 00 D0
C0D8: 00 00 00 00 3F 00 00 00 18
C0E0: 00 00 00 00 00 00 00 00 E0
C0E8: 00 00 00 00 00 00 00 00 E8
C0F0: 00 00 00 00 00 00 00 00 F0
C0F8: 00 00 00 00 00 00 00 00 F8
C100: 00 00 00 00 01 80 00 01 82
C108: 80 00 0F F0 00 01 80 00 0A
C110: 01 80 00 02 40 00 02 40 16
C118: 00 06 60 00 06 00 00 00 84
C120: 00 00 00 00 00 00 00 00 20
C128: 00 00 00 00 00 00 00 00 28
C130: 00 00 00 00 00 00 00 00 30
C138: 00 00 00 00 00 00 00 00 38
C140: 00 00 00 00 09 90 00 05 DE
C148: A0 00 03 C0 00 01 80 00 2E
C150: 01 80 00 01 40 00 01 40 54
C158: 00 03 60 00 06 00 00 00 C1
C160: 00 00 00 00 00 00 00 00 60
C168: 00 00 00 00 00 00 00 00 68
C170: 00 00 00 00 00 00 00 00 70
C178: 01 20 00 01 E0 00 01 20 9C
C180: 00 00 00 00 00 00 00 00 80
C188: 00 00 00 00 00 00 00 00 88
C190: 00 00 00 00 00 00 00 00 90
C198: 00 00 00 00 00 00 E0 FC 76
C1A0: FE FF FE FC E0 00 00 00 7C
C1A8: 00 00 00 00 00 08 08 1C D4
C1B0: 7F 1C 08 08 00 FF FF FF 5C
C1B8: FF FF FF FF FF 20 20 20 19
C1C0: 20 20 20 10 15 13 08 20 81
C1C8: 0A 0F 19 13 14 09 03 0B 39
C1D0: 20 02 15 14 14 0F 0E 20 6D
C1D8: 14 0F 20 13 14 01 12 14 6A
```

```
C1E0: 07 01 0D 05 20 02 16 05 38
C1E8: 12 A0 00 A9 9F 85 FB A9 10
C1F0: 04 85 FC 18 A5 FB 69 01 9B
C1F8: 85 FB A5 FC 69 00 85 FC 09
C200: A9 20 91 FB A5 FB C9 E9 AC
C208: D0 E9 A5 FC C9 07 D0 E3 EA
C210: 60 A0 00 A9 9F 85 FB A9 85
C218: D8 85 FC 18 A5 FB 69 01 97
C220: 85 FB A5 FC 69 00 85 FC 30
C228: AD 40 03 91 FB A5 FB C9 12
C230: E9 D0 E8 A5 FC C9 DB D0 EC
C238: E2 60 20 E9 C1 A0 00 A9 91
C240: 20 99 00 04 C8 C0 A2 D0 FA
C248: F8 60 AD 25 04 C9 39 F0 6C
C250: 0A EE 25 04 AD 25 04 8D D6
C258: 25 04 60 A9 30 8D 25 04 72
C260: AD 25 04 C9 39 F0 0A EE 24
C268: 24 04 AD 24 04 8D 24 04 1C
C270: 60 A9 30 8D 24 04 AD 23 31
C278: 04 C9 39 F0 0A EE 23 04 90
C280: AD 23 04 8D 23 04 60 A9 14
C288: 30 8D 25 04 8D 24 04 8D B2
C290: 23 04 60 A9 0E 8D 40 03 A0
C298: 20 11 C2 A9 FF 8D 0E D4 A6
C2A0: 8D 0F D4 A9 81 8D 12 D4 B1
C2A8: A9 20 8D FF 03 A0 00 AD 51
C2B0: 42 03 85 FB A9 04 85 FC A7
C2B8: A2 03 A5 FB 6D 1B D4 85 E2
C2C0: FB A5 FC 69 00 85 FC 18 63
C2C8: CA D0 EF AD 43 03 91 FB D5
C2D0: CE FF 03 AD FF 03 D0 D7 FB
C2D8: 60 A9 EB 8D 42 03 A9 24 6F
C2E0: 8D 43 03 20 93 C2 A0 00 CB
C2E8: A9 20 99 A0 04 C8 C0 78 F2
C2F0: D0 F8 60 A9 A0 8D 42 03 38
C2F8: A9 24 8D 43 03 20 93 C2 11
C300: A0 00 A9 20 99 70 07 C8 44
C308: C0 79 D0 F8 60 A9 00 8D A3
C310: 04 D4 A9 2D 8D 01 D4 A9 CC
C318: C6 8D 00 D4 A9 80 8D 05 FD
C320: D4 A9 80 8D 06 D4 A9 21 52
C328: 8D 04 D4 A0 FF A2 FF 8C 5E
C330: 01 D4 8C 27 D0 CA D0 F7 1E
C338: 88 D0 F2 A9 00 8D 04 D4 94
C340: 60 20 3A C2 A9 02 8D 40 37
C348: 03 20 11 C2 A9 00 8D 21 97
C350: D0 A0 00 B9 C3 C1 99 0E A8
C358: 06 C8 C0 1D D0 F5 AD 00 79
C360: DC 29 1F C9 0F D0 F7 A9 D0
C368: 01 8D 41 03 A9 00 8D 48 BA
C370: 03 A9 01 8D 45 03 A9 32 CF
C378: 8D 47 03 A9 01 8D FA 03 86
C380: AD 0E DC 29 FE 8D 0E DC B9
C388: A5 01 29 FB 85 01 A0 00 7B
C390: B9 00 D0 99 00 30 C8 D0 7E
C398: F7 A0 00 B9 FE D0 99 FE 53
C3A0: 30 C8 D0 F7 A5 01 09 04 16
C3A8: 85 01 AD 0E DC 09 01 8D 5F
C3B0: 0E DC A9 1C 8D 18 D0 A0 78
C3B8: 00 B9 9D C1 99 10 31 C8 75
C3C0: C0 49 D0 F5 20 3A C2 A0 4F
C3C8: 00 A9 25 99 78 04 A9 07 5E
C3D0: 99 78 D8 C8 C0 28 D0 F1 30
C3D8: A9 30 8D 23 04 8D 25 04 1E
C3E0: 8D 24 04 A9 33 8D 02 04 07
C3E8: A0 00 B9 BD C1 99 61 04 C1
C3F0: C8 C0 06 D0 F5 A9 01 A0 92
C3F8: 00 99 00 D8 C8 C0 53 D0 19
C400: F8 A9 00 8D 21 D0 A9 07 D2
C408: 8D 20 D0 A9 0F 8D 18 D4 B9
C410: 20 D8 CA AD 41 03 8D 49 9C
C418: 03 A9 B0 8D 00 D0 A9 00 7D
C420: 8D 10 D0 A9 01 8D 15 D0 AC
C428: 20 E9 C1 A9 03 8D 40 03 71
C430: 20 11 C2 AD FA 03 D0 0B AB
C438: 20 F3 C2 A9 DF 8D 01 D0 F7
C440: 4C 4B C4 20 D9 C2 A9 46 49
C448: 8D 01 D0 A9 30 8D F8 07 0F
C450: A9 08 8D 27 D0 AD FA 03 33
C458: D0 0D A9 DF 8D 01 D0 A9 C8
C460: 01 8D 15 D0 4C 6C C4 A9 FB
C468: 01 8D 15 D0 AD 1F D0 A9 24
C470: 00 8D 0B D4 18 AD 00 DC 80
C478: 29 1F C9 0F D0 03 4C FE B8
C480: C4 18 A9 00 8D 0B D4 AD 22
C488: 00 DC 29 1F C9 17 D0 03 62
C490: 4C 06 C5 C9 1B D0 03 4C AD
C498: 60 C5 AD 48 03 F0 D0 20 99
C4A0: A8 CA AC 47 03 A2 64 CA DC
C4A8: D0 FD 88 D0 F8 AD FA 03 75
C4B0: D0 0B CE 01 D0 AD 01 D0 AC
C4B8: C9 46 4C C5 C4 EE 01 D0 60
C4C0: AD 01 D0 C9 DF D0 13 CE 9C
C4C8: 49 03 AD 49 03 D0 03 4C 2F
C4D0: 92 C5 A9 01 8D 48 03 4C F8
C4D8: 19 C4 AD 1F D0 29 01 C9 48
C4E0: 01 D0 18 20 0D C3 AD 02 6B
C4E8: 04 C9 30 F0 0B CE 02 04 B7
C4F0: A9 00 8D 48 03 4C 19 C4 9D
C4F8: 4C 70 CA 4C 81 C4 A9 01 BD
C500: 8D 48 03 4C 9A C4 AD 00 32
C508: D0 C9 40 D0 0A AD 10 D0 4C
C510: C9 01 D0 03 4C 93 C4 20 73
C518: 90 CA AD 47 03 E9 14 A8 12
C520: A2 64 CA D0 FD 88 D0 F8 13
C528: EE 00 D0 AD 00 D0 D0 05 3C
C530: A9 01 8D 10 D0 AD 1F D0 E6
C538: 18 29 01 8D 4A 03 AD 4A 4D
C540: 03 C9 01 D0 18 20 0D C3 E7
C548: AD 02 04 C9 30 F0 0B CE C0
C550: 02 04 A9 00 8D 48 03 4C 25
C558: 19 C4 4C 70 CA 4C 9A C4 69
C560: AD 00 D0 C9 18 D0 08 AD 47
C568: 10 D0 D0 03 4C 93 C4 20 E1
C570: 90 CA AD 47 03 E9 14 A8 6A
C578: A2 64 CA D0 FD 88 D0 F8 6B
```

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C580: CE 00 D0 AD 00 D0 C9 FF 68
C588: D0 05 A9 00 8D 10 D0 4C C2
C590: 35 C5 20 D8 CA AD FA 03 FA
C598: D0 03 4C F2 C8 A9 00 8D AB
C5A0: EB 03 A9 00 8D ED 03 A9 61
C5A8: 01 8D EE 03 20 E9 C1 A9 9E
C5B0: 34 8D FC 07 A9 01 8D 2B D9
C5B8: D0 A9 E5 8D 09 D0 A9 96 C0
C5C0: 8D 08 D0 A9 08 8D 27 D0 5E
C5C8: A9 B0 8D 00 D0 A9 67 8D 20
C5D0: 01 D0 A9 31 8D F9 07 A9 B5
C5D8: 0D 8D 28 D0 A9 40 8D 02 E5
C5E0: D0 A9 02 8D 10 D0 A9 95 0B
C5E8: 8D 03 D0 A9 03 8D 29 D0 7E
C5F0: A9 32 8D FA 07 A9 0E 8D A1
C5F8: 2A D0 A9 35 8D FB 07 A9 0D
C600: 13 8D 15 D0 A9 00 8D 05 C2
C608: D4 8D 06 D4 8D 0C D4 8D 41
C610: 0D D4 AD 1E D0 A9 00 8D C5
C618: 4A 03 18 A9 00 8D 0B D4 94
C620: 8D 04 D4 AD 00 DC 29 1F 59
C628: C9 0F D0 45 AD ED 03 D0 86
C630: 3D AD EE 03 F0 38 A9 01 E0
C638: 8D ED 03 AD 00 D0 8D 06 C8
C640: D0 AD 10 D0 29 01 C9 01 94
C648: D0 0B AD 10 D0 09 08 8D 51
C650: 10 D0 4C 5D C6 AD 10 D0 30
C658: 29 F7 8D 10 D0 AD 01 D0 67
C660: 69 0E 8D 07 D0 18 AD 15 18
C668: D0 09 08 8D 15 D0 4C 00 0A
C670: C7 C9 17 D0 33 AD 00 D0 9B
C678: C9 22 D0 0A AD 10 D0 29 F6
C680: 01 F0 03 4C 00 C7 A9 50 83
C688: 8D 08 D4 A9 73 8D 07 D4 79
C690: A9 21 8D 0B D4 EE 00 D0 88
C698: AD 00 D0 D0 08 AD 10 D0 7E
C6A0: 09 01 8D 10 D0 4C 00 C7 2D
C6A8: C9 1B D0 29 AD 00 D0 C9 CF
C6B0: 18 D0 0A AD 10 D0 29 01 5C
C6B8: D0 03 4C 00 C7 20 90 CA 1C
C6C0: CE 00 D0 AD 00 D0 C9 FF A8
C6C8: D0 08 AD 10 D0 29 FE 8D E5
C6D0: 10 D0 4C 00 C7 C9 1E D0 7E
C6D8: 13 AD 01 D0 C9 46 D0 03 4F
C6E0: 4C 00 C7 20 A8 CA CE 01 58
C6E8: D0 4C 00 C7 C9 1D F0 03 A8
C6F0: 4C 00 C7 AD 01 D0 C9 68 B6
C6F8: F0 F6 20 A8 CA EE 01 D0 35
C700: AD EE 03 D0 10 AD 09 D0 08
C708: C9 46 D0 03 4C 7D C8 CE 4D
C710: 09 D0 4C A5 C7 AD 1B D4 41
C718: 29 31 F0 08 AD 61 03 D0 4E
C720: 43 4C 39 C7 AD 61 03 F0 B3
C728: 08 A9 00 8D 61 03 4C 1C 34
C730: C7 A9 01 8D 61 03 4C 1C FC
C738: C7 AD 08 D0 C9 18 D0 0F 48
C740: AD 10 D0 29 10 C9 10 F0 D2
C748: 06 EE 08 D0 4C 61 C7 CE 5A
C750: 08 D0 AD 08 D0 C9 FF D0 4A
C758: 08 AD 10 D0 29 EF 8D 10 A5
C760: D0 4C 8A C7 AD 08 D0 C9 20
C768: 40 D0 0F AD 10 D0 29 10 50
C770: C9 10 D0 06 CE 08 D0 4C 15
C778: 8A C7 EE 08 D0 AD 08 D0 19
C780: D0 08 AD 10 D0 09 10 8D 8E
C788: 10 D0 AD 1B D4 29 15 D0 16
C790: 14 AD FC 07 C9 34 D0 08 2D
C798: A9 33 8D FC 07 4C A5 C7 C0
C7A0: A9 34 8D FC 07 AD EC 03 AD
C7A8: D0 15 AD 03 D0 C9 47 D0 F1
C7B0: 08 A9 01 8D EC 03 4C D1 FE
C7B8: C7 CE 03 D0 4C D1 C7 AD B6
C7C0: 03 D0 C9 AD D0 08 A9 00 8E
C7C8: 8D EC 03 4C D1 C7 EE 03 1E
C7D0: D0 20 D7 C7 4C 3D C8 AD 61
C7D8: EB 03 D0 2D AD 1B D4 29 8C
C7E0: 07 F0 03 4C 3C C8 AD 10 EA
C7E8: D0 09 04 8D 10 D0 A9 01 DF
C7F0: 8D EB 03 A9 31 8D 04 D0 AA
C7F8: AD 03 D0 8D 05 D0 AD 15 A0
C800: D0 09 04 8D 15 D0 4C 3C D9
C808: C8 AD 04 D0 C9 10 D0 17 15
C810: AD 10 D0 29 04 D0 10 A9 56
C818: 00 8D EB 03 AD 15 D0 29 51
C820: FB 8D 15 D0 4C 3C C8 CE AF
C828: 04 D0 20 C0 CA AD 04 D0 2B
C830: C9 FF D0 08 AD 10 D0 29 8A
C838: FB 8D 10 D0 60 AD ED 03 A1
C840: F0 1A AD 07 D0 C9 EE F0 7A
C848: 06 EE 07 D0 4C 5C C8 AD 34
C850: 15 D0 29 F7 8D 15 D0 A9 74
C858: 00 8D ED 03 AC 47 03 A2 70
C860: 50 CA D0 FD C0 10 D0 03 EE
C868: 20 D7 C7 88 D0 F1 AD 1E 3F
C870: D0 8D 4A 03 AD 4A 03 29 40
C878: 04 C9 04 D0 13 20 0D C3 1F
C880: AD 02 04 C9 30 F0 06 CE F3
C888: 02 04 4C 92 C5 4C 70 CA BA
C890: AD EE 03 D0 41 AD 4A 03 3D
C898: 29 01 C9 01 D0 38 A0 FF 37
C8A0: A2 FF 8E 01 D4 8C 00 D4 09
C8A8: A9 21 8D 04 D4 8E 20 D0 59
C8B0: A9 00 8D 04 D4 CA D0 EA 47
C8B8: 88 D0 E5 20 4A C2 A9 07 D5
C8C0: 8D 20 D0 AD FA 03 F0 2A 06
C8C8: A9 00 8D FA 03 8D 48 03 D6
C8D0: 8D 10 D0 4C 01 C4 AD 4A 49
C8D8: 03 29 18 C9 18 D0 10 AD 8D
C8E0: 15 D0 29 F7 8D 15 D0 A9 05
C8E8: 00 8D EE 03 8D ED 03 4C 33
C8F0: 12 C6 20 D8 CA A9 01 8D C5
C8F8: 15 D0 AD 47 03 8D 8B 03 F2
C900: A9 08 8D 77 03 20 E9 C1 85
C908: A9 08 8D 27 D0 A9 FC 8D 73
C910: 00 D0 A9 00 8D 10 D0 A9 A2
C918: 7F 8D 01 D0 A9 0B 8D 40 79
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 119 and 120 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C920: 03 20 11 C2 A9 10 8D FF 5E
C928: 03 A9 A0 8D 42 03 A9 22 14
C930: 8D 43 03 20 AD C2 A9 EC 2B
C938: 8D 42 03 A9 10 8D FF 03 55
C940: 20 AD C2 A9 20 8D D4 05 02
C948: 8D D5 05 8D D6 05 8D D7 7F
C950: 05 8D FC 05 8D FD 05 8D 03
C958: FE 05 8D FF 05 AD 1F D0 8C
C960: A9 00 8D 0B D4 8D 04 D4 DD
C968: 20 C0 CA 18 AD 00 DC 29 DF
C970: 1F C9 1E D0 10 AD 01 D0 D7
C978: C9 5E F0 06 CE 01 D0 20 58
C980: A8 CA 4C 96 C9 C9 1D D0 58
C988: F9 AD 01 D0 C9 D2 F0 F2 82
C990: EE 01 D0 20 A8 CA AD 1F B1
C998: D0 29 01 C9 01 D0 1B A9 F3
C9A0: 0B 8D 40 03 20 11 C2 20 90
C9A8: 0D C3 AD 02 04 C9 30 F0 18
C9B0: 06 CE 02 04 4C F5 C8 4C E2
C9B8: 70 CA A9 00 8D 40 03 20 8E
C9C0: 11 C2 CE 77 03 AD 77 03 06
C9C8: F0 0E AC 47 03 A2 AA CA D6
C9D0: D0 FD 88 D0 F8 4C 60 C9 68
C9D8: A9 08 8D 77 03 AD E8 07 30
C9E0: 8D 79 03 A9 E7 85 FB A9 A7
C9E8: 07 85 FC A0 00 B1 FB 8D 4E
C9F0: 7A 03 18 A5 FB 69 01 85 18
C9F8: FB A5 FC 69 00 85 FC AD 31
CA00: 7A 03 91 FB 38 A5 FB E9 CE
CA08: 02 85 FB A5 FC E9 00 85 9D
CA10: FC A5 FB C9 9F D0 D6 A5 65
CA18: FC C9 04 D0 D0 AD 79 03 AE
CA20: 8D A0 04 AD 1B D4 29 01 1A
CA28: F0 03 4C 60 C9 A9 0B 8D D4
CA30: 40 03 20 11 C2 EE 8B 03 E4
CA38: AD 8B 03 C9 40 F0 03 4C BE
CA40: 60 C9 4C 11 CB AD 47 03 8B
CA48: C9 19 F0 03 CE 47 03 AD E5
CA50: 41 03 C9 14 F0 03 EE 41 96
CA58: 03 A9 01 8D FA 03 A9 00 3B
CA60: 8D 48 03 AD 02 04 C9 33 E9
CA68: F0 03 EE 02 04 4C 10 C4 72
CA70: 20 E9 C1 A9 00 8D 15 D0 59
CA78: A9 03 8D 40 03 20 11 C2 E9
CA80: A0 00 B9 E0 C1 99 C7 05 E3
CA88: C8 C0 09 D0 F5 4C 51 C3 43
CA90: A9 50 8D 08 D4 A9 73 8D 9F
CA98: 07 D4 A9 00 8D 0C D4 8D 1A
CAA0: 00 D4 A9 21 8D 0B D4 60 0E
CAA8: A9 36 8D 08 D4 A9 6F 8D 99
CAB0: 07 D4 A9 00 8D 0C D4 8D 32
CAB8: 0D D4 A9 11 8D 0B D4 60 23
CAC0: A9 10 8D 01 D4 A9 6F 8D 84
CAC8: 00 D4 A9 00 8D 05 D4 8D 3C
CAD0: 06 D4 A9 21 8D 04 D4 60 3D
CAD8: AD 15 D0 8D 61 03 A9 00 08
CAE0: 8D 15 D0 A0 FF A2 64 CA C6
CAE8: AD 1E D0 AD 1F D0 20 A8 EB
CAF0: CA E0 00 D0 F2 A9 00 8D 97
CAF8: 0B D4 20 90 CA 8C 21 D0 D2
CB00: 88 C0 00 D0 E0 A9 00 8D 32
CB08: 21 D0 AD 61 03 8D 15 D0 7F
CB10: 60 AD 41 03 8D 49 03 20 5C
CB18: D8 CA A9 01 8D 7E 03 20 95
CB20: E9 C1 A9 01 8D 40 03 20 67
CB28: 11 C2 A9 08 8D 27 D0 A9 DC
CB30: 01 8D 10 D0 A9 7F 8D 01 57
CB38: D0 A9 40 8D 00 D0 A9 01 FB
CB40: 8D 15 D0 A9 AA 85 FB A9 33
CB48: 04 85 FC A0 00 A2 0A 18 34
CB50: A9 25 91 FB A5 FB 69 28 DF
CB58: 85 FB A5 FC 69 00 85 FC 68
CB60: CA D0 EC AD 1F D0 AD 7E B2
CB68: 03 F0 0E AD 00 DC 29 1F 3D
CB70: C9 0F D0 74 A9 00 8D 7E 44
CB78: 03 AD 00 DC 29 1F C9 1E 36
CB80: D0 0D AD 01 D0 C9 46 F0 DE
CB88: 17 CE 01 D0 20 A8 CA C9 9D
CB90: 1D D0 0D AD 01 D0 C9 E2 B7
CB98: F0 06 EE 01 D0 20 A8 CA E3
CBA0: AD 10 D0 D0 15 AD 00 D0 93
CBA8: C9 18 D0 0E CE 49 03 AD 32
CBB0: 49 03 F0 03 4C 1F CB 4C 74
CBB8: 45 CA CE 00 D0 20 90 CA E3
CBC0: AD 00 D0 C9 FF D0 05 A9 88
CBC8: 00 8D 10 D0 AD 1F D0 29 FD
CBD0: 01 C9 01 D0 13 20 0D C3 71
CBD8: AD 02 04 C9 30 F0 06 CE 4C
CBE0: 02 04 4C 17 CB 4C 70 CA 9D
CBE8: AC 47 03 A2 50 CA D0 FD 6C
CBF0: 88 D0 F8 A9 00 8D 04 D4 53
CBF8: 8D 0B D4 AD 1B D4 29 03 30
CC00: F0 03 4C 66 CB AD AA 04 CE
CC08: 8D 5C 03 A9 D2 85 FB A9 9C
CC10: 04 85 FC A0 00 B1 FB 8D 72
CC18: 5D 03 38 A5 FB E9 28 85 E9
CC20: FB A5 FC E9 00 85 FC AD D8
CC28: 5D 03 91 FB 18 A5 FB 69 39
CC30: 50 85 FB A5 FC 69 00 85 93
CC38: FC A5 FB C9 F2 D0 D6 A5 E0
CC40: FC C9 07 D0 D0 AD 5C 03 BC
CC48: 8D CA 07 4C 66 CB 00 00 26
```

128 RAM CHECK
FROM PAGE 39

```
·10 REM *** 128 RAM CHECK *** BUCK CHILDR
  ESS ***                                    OI
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
```

```
9 ***                                                    DC
·30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=4864:L=90                                  OG
·40 PRINTCHR$(19)TAB(31)L:PRINT:FORB=0TO1
1:READA:IFA<0ORA>255THEN80                              MB
·50 POKEJ+B,A:X=X+A:NEXTB:READA:IFA<>XTHE
N80                                                     JF
·60 X=0:J=J+12:L=L+10:IFL<461THEN40                     AN
·70 PRINT"THE DATA IS OK AND LOADED.":PRI
NT:PRINT"SYS 4864 TO ACTIVATE.":END                     PL
·80 PRINT"ERROR IN DATA LINE:"L:END                     HL
·90 DATA169,0,162,11,160,16,141,0,255,133
,250,133,1430                                           NO
·100 DATA254,134,251,132,252,32,125,255,1
47,0,162,5,1749                                         NK
·110 DATA160,13,24,32,240,255,32,125,255,
42,42,32,1252                                           JN
·120 DATA66,65,78,75,32,48,32,42,42,13,17
,67,577                                                 OC
·130 DATA72,69,67,75,73,78,71,32,67,65,83
,83,835                                                 KL
·140 DATA69,84,84,69,32,66,85,70,70,69,82
,44,824                                                 KH
·150 DATA13,73,78,80,85,84,47,79,85,84,80
,85,873                                                 MH
·160 DATA84,32,66,85,70,70,69,82,83,44,32
,65,782                                                 FP
·170 DATA78,68,13,83,80,82,73,84,69,32,68
,69,799                                                 OM
·180 DATA70,73,78,73,84,73,79,78,32,65,82
,69,856                                                 JL
·190 DATA65,32,32,0,56,32,240,255,134,65,
132,66,1109                                             OF
·200 DATA160,0,132,253,169,63,141,0,255,1
64,253,152,1742                                         MF
·210 DATA141,99,4,166,254,240,29,162,250,
142,185,2,1674                                          IC
·220 DATA142,200,2,160,0,140,0,255,162,1,
32,119,1213                                             KM
·230 DATA255,162,1,32,122,255,240,12,208,
87,144,200,1718                                         PA
·240 DATA162,0,129,250,193,250,208,77,168
,200,132,253,2022                                       BE
·250 DATA208,198,140,0,255,166,65,164,66,
24,32,240,1558                                          KC
·260 DATA255,32,125,255,18,0,165,251,166,
250,32,50,1599                                          HO
·270 DATA142,230,250,208,171,230,251,165,
251,197,252,144,2491                                    JP
·280 DATA163,166,65,164,66,24,32,240,255,
32,125,255,1587                                         KC
·290 DATA42,42,42,32,79,75,32,42,42,42,13
,0,483                                                  ON
·300 DATA165,252,201,255,144,58,165,254,2
40,58,96,144,2032                                       FO
·310 DATA169,169,0,141,0,255,166,65,164,6
6,24,32,1251                                            AG
·320 DATA240,255,32,125,255,42,32,69,82,8
2,79,82,1375                                            CK
·330 DATA32,0,165,251,166,250,32,50,142,3
2,125,255,1500                                          FN
·340 DATA32,42,13,0,165,254,208,210,133,2
50,165,252,1724                                         BC
·350 DATA201,208,176,4,144,72,144,199,32,
125,255,17,1577                                         HK
·360 DATA17,29,29,29,29,29,29,29,29,29,29
,29,336                                                 AL
·370 DATA29,29,42,42,32,66,65,78,75,32,49
,32,571                                                 CH
·380 DATA42,42,13,0,162,4,134,254,160,255
,134,251,1451                                           PH
·390 DATA132,252,32,125,255,17,67,72,69,6
7,75,73,1236                                            LB
·400 DATA78,71,32,66,65,83,73,67,32,82,65
,77,791                                                 CE
·410 DATA32,32,0,24,144,184,165,252,162,2
8,201,28,1252                                           EC
·420 DATA176,214,169,19,133,251,134,252,3
2,125,255,17,1777                                       ON
·430 DATA67,72,69,67,75,73,78,71,32,70,82
,69,825                                                 OL
·440 DATA69,32,82,65,77,32,32,0,162,0,189
,124,864                                                MI
·450 DATA19,157,0,14,189,124,20,157,0,15,
232,208,1135                                            MA
·460 DATA241,76,0,14,0,0,0,0,0,0,0,0,331                DC
```

GUARDIAN
FROM PAGE 74

Starting address in hex: C000
Ending address in hex: CFFA
SYS to start: 49152

***Flankspeed* required for entry! See page 121.**

```
C000: A9 00 8D D8 02 8D D9 02 7B
C008: A9 03 8D D6 02 A9 0B 8D 5D
C010: 22 D0 A9 0C 8D 23 D0 A9 E3
C018: 0F 8D 24 D0 A9 05 8D D5 BB
C020: 02 78 A5 01 29 FB 85 01 EC
C028: A9 00 85 FB 85 FD A9 D0 51
C030: 85 FC A9 38 85 FE A2 08 C3
C038: A0 00 B1 FB 91 FD 88 D0 6F
C040: F9 E6 FC E6 FE CA D0 F0 90
C048: A5 01 09 04 85 01 58 20 FA
C050: CE C6 20 73 C7 20 81 C9 AC
C058: 20 4D CB AD 18 D0 09 0E 3F
C060: 8D 18 D0 A9 FF 8D 0F D4 F1
C068: A9 80 8D 12 D4 20 5A CA 4C
C070: A9 92 20 D2 FF A2 00 A0 E2
C078: 07 8C 86 02 18 20 F0 FF BD
C080: AD D9 02 AE D8 02 20 CD 81
C088: BD A9 30 20 D2 FF AD D6 97
C090: 02 38 C9 03 B0 0F 48 A2 42
C098: 00 A0 25 18 20 F0 FF A9 31
C0A0: 20 20 D2 FF 68 38 C9 02 20
```

```
C0A8: B0 0F 48 A2 00 A0 24 18 30
C0B0: 20 F0 FF A9 20 20 D2 FF 7E
C0B8: 68 38 C9 01 B0 0D A2 00 84
C0C0: A0 23 18 20 F0 FF A9 20 77
C0C8: 20 D2 FF AD 11 D0 10 FB 57
C0D0: AD 1E D0 29 3F 8D C8 02 2E
C0D8: 20 3D C2 CE C3 02 D0 09 67
C0E0: 20 3F C3 AD D5 02 8D C3 DA
C0E8: 02 AD B9 02 D0 77 A9 0A 50
C0F0: CD BB 02 D0 32 A9 04 8D BA
C0F8: 2D D0 A9 DD 8D FE 07 A9 BB
C100: E6 85 A2 A5 A2 D0 FC A2 C7
C108: 07 20 7F C5 A9 80 0D 15 C0
C110: D0 8D 15 D0 20 7F C5 A2 5C
C118: 07 20 7F C5 A9 00 8D 15 D0
C120: D0 20 48 C6 4C 00 C0 AE DB
C128: BA 02 A0 10 18 20 F0 FF BE
C130: A0 FF C8 98 48 0A AA E8 18
C138: BD B9 C8 A8 CA BD B9 C8 2C
C140: 20 1E AB A9 58 A0 C8 20 B5
C148: 1E AB 68 A8 CC BB 02 D0 7E
C150: E1 A9 10 8D B9 02 A9 09 E7
C158: CD BB 02 D0 08 A9 C0 0D 34
C160: 1B D0 8D 1B D0 AD C8 02 3E
C168: C9 09 F0 08 C9 0D F0 04 FF
C170: C9 39 D0 1D AD C5 02 C9 A0
C178: 05 D0 16 A2 00 20 7F C5 6C
C180: CE D6 02 D0 06 20 57 C6 3D
C188: 4C 00 C0 20 8F CA 4C 70 CC
C190: C0 AD C8 02 C9 05 D0 03 6C
C198: 4C 7B C1 AD C8 02 C9 2B 8F
C1A0: F0 08 C9 0A F0 04 C9 3B 67
C1A8: D0 5C AD C1 02 30 57 AD 7C
C1B0: 01 D0 38 E9 AA 8D CB 02 AA
C1B8: AD C7 02 38 CD CB 02 B0 B4
C1C0: 45 AD C7 02 18 69 0F 38 46
C1C8: CD CB 02 90 39 A9 FD 2D 03
C1D0: 15 D0 8D 15 D0 A2 03 20 EF
C1D8: 7F C5 A9 D3 2D 15 D0 8D 3C
C1E0: 15 D0 A9 00 8D AE 02 20 CE
C1E8: D4 CA AC C2 02 C8 A9 32 9E
C1F0: A2 00 18 6D D8 02 8D D8 5A
C1F8: 02 8A 6D D9 02 8D D9 02 38
C200: 88 D0 EB 4C 70 C0 AD BB 2C
C208: 02 C9 09 D0 2D AD 02 D0 5B
C210: 38 C9 A6 90 25 38 C9 B2 23
C218: B0 20 AD 03 D0 38 C9 82 EE
C220: 90 18 38 C9 8A B0 13 A9 C2
C228: 02 0D 1D D0 8D 1D D0 A2 43
C230: 01 20 7F C5 20 12 C6 4C DB
C238: 21 C0 4C CB C0 AD 00 DC 7D
C240: AA 29 10 D0 59 AD AE 02 AC
C248: D0 54 A9 01 8D AE 02 AD 04
C250: 00 D0 18 69 0C 8D 02 D0 0F
C258: AD 01 D0 38 E9 0F 8D 03 99
C260: D0 A9 02 0D 17 D0 8D 17 76
C268: D0 A9 02 0D 15 D0 8D 15 7A
C270: D0 A9 02 8D B2 02 A9 02 DA
C278: 8D B1 02 AD 00 D0 38 C9 3A
C280: 7A 90 0A 38 C9 CC B0 0A 1F
C288: A9 00 4C 97 C2 A9 01 4C CF
C290: 97 C2 A9 FF 4C 97 C2 8D C8
C298: B3 02 8A 09 10 AA 8A C9 F0
C2A0: 7B D0 10 AD 00 D0 C9 50 95
C2A8: F0 06 CE 00 D0 CE 08 D0 E6
C2B0: 4C E6 C2 C9 77 D0 10 AD 76
C2B8: 00 D0 C9 FA F0 06 EE 00 34
C2C0: D0 EE 08 D0 4C E6 C2 C9 19
C2C8: 7E D0 0D AD 01 D0 C9 D7 46
C2D0: F0 03 EE 01 D0 4C E6 C2 7B
C2D8: C9 7D D0 0A AD 01 D0 C9 44
C2E0: AA F0 03 CE 01 D0 AD AE 7C
C2E8: 02 F0 03 20 EF C2 60 CE E0
C2F0: B1 02 D0 4A A9 02 8D B1 AA
C2F8: 02 AD 03 D0 48 38 C9 8C 53
C300: B0 0D A9 FD 2D 17 D0 8D 08
C308: 17 D0 A9 01 8D B2 02 68 45
C310: 38 ED B2 02 8D 03 D0 38 84
C318: C9 64 90 0D AD 02 D0 18 7C
C320: 6D B3 02 8D 02 D0 38 B0 8C
C328: 15 A9 FD 2D 15 D0 8D 15 9A
C330: D0 A9 00 8D AE 02 A9 FD 90
C338: 2D 10 D0 8D 10 D0 60 AD C2
C340: 15 D0 29 28 F0 03 4C BF 77
C348: C3 A9 08 0D 1B D0 8D 1B 5F
C350: D0 A9 0A 8D C4 02 A9 00 D2
C358: 8D 2A D0 8D C5 02 8D C6 8A
C360: 02 A9 DE 8D FB 07 AD 1B 44
C368: D4 29 03 AA BD D9 C8 8D 02
C370: FD 07 8E C2 02 BD D5 C8 25
C378: 8D 2C D0 A9 FF 8D C1 02 FD
C380: A9 8A 8D 07 D0 8D 0B D0 83
C388: A9 A0 8D 06 D0 A9 AB 8D 1A
C390: 0A D0 A9 DF 2D 17 D0 8D 97
C398: 17 D0 A9 DF 2D 1D D0 8D B2
C3A0: 1D D0 A9 08 0D 17 D0 8D C2
C3A8: 17 D0 A9 08 0D 1D D0 8D CA
C3B0: 1D D0 A9 00 8D C0 02 A9 42
C3B8: 28 0D 15 D0 8D 15 D0 A2 E9
C3C0: 06 A0 0A AD C1 02 10 06 F8
C3C8: 98 48 8A A8 68 AA BD 00 AD
C3D0: D0 18 6D C0 02 9D 00 D0 58
C3D8: E8 BD 00 D0 18 6D C1 02 99
C3E0: 9D 00 D0 AD C1 02 10 03 D3
C3E8: 4C A8 C4 B9 00 D0 18 6D B2
C3F0: C0 02 99 00 D0 C8 B9 00 A0
C3F8: D0 18 6D C1 02 99 00 D0 7D
C400: CE C4 02 F0 03 4C 1D C5 B8
C408: A9 14 8D C4 02 AE C5 02 90
C410: E0 05 F0 F1 EE C5 02 AD 3D
C418: C5 02 0A 0A 18 6D C5 02 41
C420: AA AD C6 02 D0 27 BD DD D4
C428: C8 8D C6 02 F0 1F AD 06 0B
C430: D0 18 69 09 8D 04 D0 AD 9B
C438: 07 D0 18 69 0B 8D 05 D0 FF
C440: A9 00 8D 29 D0 A9 04 0D 2C
```

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C448: 15 D0 8D 15 D0 E8 A9 D7 0C
C450: 2D 1D D0 1D DD C8 8D 1D D9
C458: D0 A9 D7 2D 17 D0 1D DD BA
C460: C8 8D 17 D0 E8 BD DD C8 EB
C468: 18 6D 06 D0 8D 06 D0 BD E6
C470: DD C8 18 6D 07 D0 8D 07 09
C478: D0 BD DD C8 18 6D 0A D0 0E
C480: 8D 0A D0 BD DD C8 18 6D D2
C488: 0B D0 8D 0B D0 E8 AC C2 26
C490: 02 B9 D9 C8 18 7D DD C8 2B
C498: 8D FB 07 E8 A9 DB 18 7D 2D
C4A0: DD C8 8D FD 07 4C 1D C5 09
C4A8: AD 0B D0 38 C9 78 B0 6D CA
C4B0: A9 D7 2D 17 D0 8D 17 D0 BC
C4B8: A9 D7 2D 1D D0 8D 1D D0 D0
C4C0: A9 01 8D C1 02 AE C2 02 30
C4C8: BD D5 C8 8D 2A D0 A9 00 57
C4D0: 8D 2C D0 AE 0A D0 8E 06 79
C4D8: D0 AD C2 02 C9 02 F0 1C F4
C4E0: C9 03 F0 18 AD 1B D4 29 7D
C4E8: 1F 8D C7 02 AD 0B D0 38 21
C4F0: E9 1F 18 6D C7 02 8D 07 DD
C4F8: D0 4C 0A C5 AD 0B D0 38 A7
C500: E9 05 8D 07 D0 A9 05 8D 90
C508: C7 02 AD FD 07 8D FB 07 15
C510: A9 DB 8D FD 07 A9 F7 2D F6
C518: 1B D0 8D 1B D0 AD C5 02 F2
C520: 38 C9 01 90 20 AD 06 D0 58
C528: 38 CD 00 D0 F0 12 90 08 9A
C530: A9 FF 8D C0 02 4C 45 C5 81
C538: A9 01 8D C0 02 4C 45 C5 8A
C540: A9 00 8D C0 02 AD 0B D0 C3
C548: C9 08 D0 08 A9 D7 2D 15 B6
C550: D0 8D 15 D0 AD C6 02 F0 FB
C558: 25 EE 05 D0 EE 05 D0 AD B4
C560: 04 D0 18 6D C0 02 8D 04 0F
C568: D0 AD 05 D0 8D 29 D0 30 74
C570: 0D A9 FB 2D 15 D0 8D 15 D8
C578: D0 A9 00 8D C6 02 60 A9 53
C580: 80 8D 0B D4 A9 D8 9D F8 87
C588: 07 BD B8 C7 0D 1C D0 8D 55
C590: 1C D0 A9 0F 8D 08 D4 A9 4A
C598: 0F 8D 07 D4 A9 F0 8D 0D 46
C5A0: D4 A9 00 8D 0C D4 A9 81 B8
C5A8: 8D 0B D4 A9 0F 8D A7 02 06
C5B0: 8E A8 02 20 97 E0 A5 8E B6
C5B8: AE A8 02 9D 27 D0 A9 FF 51
C5C0: 85 A2 A5 A2 D0 FC BD 27 E3
C5C8: D0 8D 26 D0 A9 FE 85 A2 EE
C5D0: A5 A2 D0 FC BD 27 D0 8D 2A
C5D8: 25 D0 A9 FD 85 A2 A5 A2 E6
C5E0: D0 FC AE A8 02 AC A7 02 5E
C5E8: 88 8C A7 02 8C 07 D4 8C 9C
C5F0: 0C D4 D0 BF A9 FF 38 FD 42
C5F8: B8 C7 2D 15 D0 8D 15 D0 FF
C600: A9 80 8D 0B D4 A9 FF 38 79
C608: FD B8 C7 2D 1C D0 8D 1C 4A
C610: D0 60 A9 01 8D B5 02 8D BE
C618: AF 02 8D 15 D0 A2 03 A0 83
C620: 05 18 20 F0 FF A9 11 A0 A9
C628: C8 20 1E AB A9 32 85 A2 DE
C630: A5 A2 D0 FC EE 22 D0 EE 17
C638: 23 D0 EE 24 D0 AD D5 02 95
C640: C9 01 F0 03 CE D5 02 60 06
C648: A2 03 A0 05 18 20 F0 FF BC
C650: A9 EE A0 C7 20 1E AB A2 DD
C658: 05 A0 05 18 20 F0 FF A9 D5
C660: 34 A0 C8 20 1E AB AD 00 95
C668: DC C9 7F D0 F9 AD 00 DC E3
C670: C9 7F F0 F9 60 A2 18 A9 69
C678: 00 9D 00 D4 CA 10 FA A9 6A
C680: F0 8D 06 D4 A9 11 8D 04 26
C688: D4 A9 0F 8D 18 D4 60 AE 9F
C690: B5 02 BD 7F C9 8D B6 02 95
C698: 8A 0A AA BD 7B C9 85 02 62
C6A0: E8 BD 7B C9 85 03 CE AF 93
C6A8: 02 D0 22 A9 10 8D AF 02 96
C6B0: AC B0 02 38 CC B6 02 90 5E
C6B8: 05 A0 00 8E B0 02 B1 02 53
C6C0: 8D 01 D4 C8 B1 02 8D 00 2E
C6C8: D4 C8 8C B0 02 60 A9 F4 A4
C6D0: 8D 14 03 A9 C6 8D 15 03 8B
C6D8: A9 01 8D 12 D0 AD 11 D0 83
C6E0: 29 7F 8D 11 D0 A9 81 8D B1
C6E8: 1A D0 20 75 C6 A9 00 8D 67
C6F0: B9 02 58 60 AD 19 D0 8D 8A
C6F8: 19 D0 29 01 D0 07 AD 0D 9F
C700: DC 58 4C 31 EA AD 12 D0 2E
C708: 38 C9 3A B0 0A A9 02 8D 38
C710: 21 D0 A9 3A 4C 1E C7 A9 C1
C718: 00 8D 21 D0 A9 01 8D 12 E1
C720: D0 20 8F C6 CE AD 02 D0 B6
C728: 47 AD 22 D0 AC 23 D0 AE 5F
C730: 24 D0 8D 23 D0 8C 24 D0 28
C738: 8E 22 D0 A9 0C 8D AD 02 AC
C740: CE B4 02 D0 2B A9 0A 8D 03
C748: B4 02 EE 0E D0 AD 0C D0 57
C750: 38 E9 01 8D 0C D0 B0 08 96
C758: A9 BF 2D 10 D0 8D 10 D0 3E
C760: AD B9 02 F0 0B CE B9 02 50
C768: D0 06 CE BA 02 EE BB 02 77
C770: 4C BC FE A9 B9 85 FB A9 07
C778: CF 85 FC A0 00 B1 FB F0 0A
C780: 36 A2 00 18 0A 48 8A 2A 78
C788: AA 68 0A 48 8A 2A AA 68 B5
C790: 0A 48 8A 2A AA 68 85 FD 2E
C798: C6 FD 8A 18 69 38 85 FE 26
C7A0: A0 08 B1 FB 91 FD 88 D0 DF
C7A8: F9 A5 FB 18 69 09 85 FB 50
C7B0: 90 02 E6 FC 4C 7B C7 60 17
C7B8: 01 02 04 08 10 20 40 80 B8
C7C0: 8E 08 92 90 20 53 43 4F 80
C7C8: 52 45 3A 20 20 20 20 20 3B
C7D0: 20 20 20 12 20 47 55 41 41
C7D8: 52 44 49 41 4E 20 92 20 1B
C7E0: 20 20 20 53 48 49 50 53 C9
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C7E8: 3A 2A 2A 2A 20 00 12 90 64
C7F0: 20 54 48 45 20 45 41 52 EB
C7F8: 54 48 20 48 41 53 20 42 F4
C800: 45 45 4E 20 44 45 53 54 2A
C808: 52 4F 59 45 44 20 21 20 ED
C810: 00 12 90 59 4F 55 20 48 19
C818: 41 56 45 20 53 41 56 45 45
C820: 44 20 54 48 45 20 50 4C 23
C828: 41 4E 45 54 20 45 41 52 4A
C830: 54 48 21 00 12 90 50 52 33
C838: 45 53 53 20 46 49 52 45 6B
C840: 20 42 55 54 54 4F 4E 20 5E
C848: 54 4F 20 50 4C 41 59 20 63
C850: 41 47 41 49 4E 21 92 00 65
C858: 11 9D 9D 9D 9D 9D 9D 9D B8
C860: 9D 9D 00 1E 92 20 20 20 AC
C868: 20 20 20 20 20 20 00 20 49
C870: 20 20 20 25 20 20 20 20 76
C878: 00 20 20 20 3C 23 3E 20 96
C880: 20 20 00 20 20 3C 23 23 83
C888: 23 3E 20 20 00 20 3C 23 A9
C890: 23 23 23 23 3E 20 00 3C B7
C898: 23 23 23 23 23 23 23 3E CC
C8A0: 00 23 23 23 23 23 23 23 96
C8A8: 23 23 00 23 23 23 23 12 8D
C8B0: 90 25 1E 92 23 23 23 23 A3
C8B8: 00 63 C8 6F C8 79 C8 83 E2
C8C0: C8 8D C8 97 C8 A1 C8 A1 4C
C8C8: C8 A1 C8 AB C8 CF D9 DF F9
C8D0: D0 DA DB D6 D7 01 03 0D 18
C8D8: 08 D0 D0 D3 D3 00 00 00 2A
C8E0: 00 00 00 00 00 01 00 01 E2
C8E8: 00 00 02 01 00 28 F4 01 0A
C8F0: 00 01 28 00 02 01 00 28 45
C8F8: 00 02 01 04 30 04 FB 04 34
C900: 30 04 FB 00 00 04 B4 00 E8
C908: 00 04 B4 00 00 04 B4 04 7D
C910: 70 04 FB 04 70 00 00 04 F8
C918: B4 00 00 04 30 04 B4 04 BD
C920: 70 04 FB 04 70 04 B4 04 C1
C928: B4 05 98 05 ED 05 98 00 0B
C930: 00 05 98 05 ED 00 00 04 C4
C938: 30 04 B4 04 30 04 70 04 CD
C940: FB 04 30 05 98 05 ED 00 01
C948: 00 05 ED 00 00 00 00 05 40
C950: ED 05 98 00 00 1C 31 1C 45
C958: 31 1C 31 1D DF 12 D1 13 CA
C960: EF 16 60 16 60 16 60 16 C9
C968: 60 1C 31 1C 31 1C 31 1D CD
C970: DF 12 D1 13 EF 16 60 16 C3
C978: 60 00 00 FB C8 55 C9 5A 17
C980: 26 AD 11 D0 29 EF 8D 11 ED
C988: D0 A9 90 20 D2 FF A9 93 C3
C990: 20 D2 FF A9 00 8C 21 D0 AB
C998: 8D 15 D0 8D 20 D0 AD 11 49
C9A0: D0 09 40 8D 11 D0 A9 0F E2
C9A8: 85 FD A9 19 85 FE A9 05 22
C9B0: 8D A7 02 A9 09 8D A9 02 D3
C9B8: A9 58 20 1C CA C6 FD E6 6D
C9C0: FE EE A9 02 A9 98 20 1C D8
C9C8: CA C6 FD E6 FE EE A9 02 D8
C9D0: A9 D8 20 1C CA C6 FD E6 06
C9D8: FE EE A9 02 CE A7 02 F0 DB
C9E0: 03 4C B8 C9 A2 00 A0 18 0E
C9E8: A9 98 20 EC CA A2 00 A0 46
C9F0: 00 18 20 F0 FF A9 C0 A0 25
C9F8: C7 20 1E AB A2 4B 8A 48 6B
CA00: 20 97 E0 A4 8E 68 AA A9 88
CA08: 2E 99 28 04 98 99 28 D8 2F
CA10: CA D0 EB AD 11 D0 09 10 40
CA18: 8D 11 D0 60 AC A9 02 A2 E2
CA20: 00 20 EC CA E8 E4 FD D0 94
CA28: F8 48 A9 04 8D A8 02 68 B7
CA30: 20 EC CA C8 CE A8 02 D0 1B
CA38: F7 20 EC CA E8 E4 FE D0 A5
CA40: F8 48 A9 04 8D A8 02 68 CF
CA48: 20 EC CA 88 CE A8 02 D0 F2
CA50: F7 20 EC CA E8 E0 28 D0 E2
CA58: F8 60 A2 14 A9 00 9D A7 57
CA60: 02 9D C0 02 CA 10 F7 A9 3F
CA68: 0C 8D BA 02 8D C3 02 8D 9F
CA70: B4 02 8D B9 02 8D AF 02 AF
CA78: A9 46 8D 0D D0 8D 0F D0 41
CA80: A9 50 8D 0C D0 A9 05 8D 21
CA88: 0E D0 A9 40 8D 10 D0 A9 69
CA90: 11 8D 1D D0 A9 D1 8D 15 3B
CA98: D0 A9 01 8D 27 D0 8D 28 4F
CAA0: D0 8D 2A D0 A9 00 8D 2B 5C
CAA8: D0 8D 2C D0 8D 2D D0 8D 1D
CAB0: 17 D0 A2 07 BD CD C8 9D 34
CAB8: F8 07 CA 10 F7 A9 84 8D 47
CAC0: 1C D0 A9 D2 8D 01 D0 A9 33
CAC8: E6 8D 09 D0 A9 A0 8D 00 EE
CAD0: D0 8D 08 D0 A9 06 8D 26 6B
CAD8: D0 8D 25 D0 A9 05 8D 2E 97
CAE0: D0 AD 11 D0 10 FB AD 1E 19
CAE8: D0 D0 F6 60 8D AA 02 8E AA
CAF0: AB 02 8C AC 02 48 8A 48 F4
CAF8: 98 A2 00 0A 48 8A 2A AA E5
CB00: 68 0A 48 8A 2A AA 68 0A 8C
CB08: 48 8A 2A AA 68 0A 48 8A F4
CB10: 2A AA 68 0A 48 8A 2A AA FE
CB18: 68 85 FB 86 FC 98 A2 00 C0
CB20: 0A 48 8A 2A AA 68 0A 48 8C
CB28: 8A 2A AA 68 0A 48 8A 2A F6
CB30: AA 68 18 65 FB 85 FB 8A C8
CB38: 65 FC 69 04 85 FC 68 A8 9B
CB40: 68 91 FB AD AA 02 AE AB EA
CB48: 02 AC AC 02 60 A9 33 85 68
CB50: FC A9 C0 85 FB A9 79 85 E1
CB58: FD A9 CB 85 FE A2 04 A0 97
CB60: 00 B1 FD 91 FB 88 D0 F9 F0
CB68: E6 FC E6 FE CA D0 F0 A0 5F
CB70: 40 B1 FD 91 FB 88 10 F9 80
CB78: 60 00 00 00 00 00 00 00 D8
CB80: 00 00 00 00 00 00 00 00 80
```

```
CB88: 01 00 80 02 00 40 04 00 50
CB90: 20 0F 3C F0 1D 7E B8 3A 7B
CB98: FF 5C 75 E7 AE EB FF D7 C4
CBA0: 9F E7 F9 9E 7E 79 FE 66 1E
CBA8: 7F 06 66 60 07 FF E0 00 DC
CBB0: 81 00 00 99 00 00 FF 00 CB
CBB8: 00 00 00 00 00 00 00 00 B8
CBC0: 00 00 00 00 00 00 00 00 C0
CBC8: 00 00 00 00 00 00 00 00 C8
CBD0: 00 00 38 00 00 6C 00 00 75
CBD8: 92 00 00 82 00 00 00 00 ED
CBE0: 00 00 00 00 00 00 00 00 E0
CBE8: 00 00 00 00 00 00 00 00 E8
CBF0: 00 00 00 00 00 00 00 00 F0
CBF8: 00 00 00 00 00 00 00 00 F8
CC00: 00 00 00 00 00 00 00 00 00
CC08: 00 00 00 00 00 00 00 7C 84
CC10: 00 00 C6 00 01 FF 00 03 DA
CC18: 55 80 06 FE C0 09 55 20 32
CC20: 0A 38 A0 0C 00 60 08 00 77
CC28: 20 00 00 00 00 00 00 00 48
CC30: 00 00 00 00 00 00 00 00 30
CC38: 00 00 00 00 00 00 00 00 38
CC40: 00 00 00 00 00 00 00 00 40
CC48: 01 FF 80 03 42 C0 06 BD 93
CC50: 60 0D 5A B0 1A 99 58 37 0C
CC58: FF EC 6E 99 76 DC 5A 3B 36
CC60: D8 3C 1B E0 00 07 C0 00 39
CC68: 03 C0 00 03 00 00 00 00 2F
CC70: 00 00 00 00 00 00 00 00 70
CC78: 00 00 00 00 00 00 00 00 78
CC80: 00 00 00 00 00 00 00 00 80
CC88: 00 00 00 00 28 00 00 BA 6B
CC90: 00 00 54 00 00 38 00 00 1D
CC98: 28 00 00 10 00 00 38 00 09
CCA0: 00 7C 00 00 00 00 00 00 1D
CCA8: 00 00 00 00 00 00 00 00 A8
CCB0: 00 00 00 00 00 00 00 00 B0
CCB8: 00 00 00 00 00 00 00 00 B8
CCC0: 00 00 00 00 00 00 24 00 E4
CCC8: 00 5A 00 00 7E 00 01 3C DE
CCD0: 80 03 18 C0 00 99 00 00 C6
CCD8: 7E 00 00 24 00 00 3C 00 B7
CCE0: 00 18 00 00 18 00 00 3C 4D
CCE8: 00 00 FF 00 00 00 00 00 E8
CCF0: 00 00 00 00 00 00 00 00 F0
CCF8: 00 00 22 00 00 7F 00 00 9A
CD00: C9 80 00 FF 80 04 7F 10 5E
CD08: 12 3E 24 0E 1C 38 03 1C FD
CD10: 60 01 FF C0 00 FF 80 00 B2
CD18: 41 00 00 7F 00 00 7F 00 58
CD20: 00 7F 00 00 1C 00 00 1C D7
CD28: 00 00 1C 00 00 3E 00 00 82
CD30: 7F 00 00 FF 80 07 FF F0 28
CD38: 00 00 00 00 00 FF 00 03 3B
CD40: FF C0 07 FF E0 0F FF F0 E8
CD48: 1F FF F8 1F FF F8 3F FF B7
CD50: FC 3F FF FC 3F FF FC 3F 05
CD58: FF FC 3F FF FC 3F FF FC CD
CD60: 1F FF F8 1F FF F8 0F FF 9F
CD68: F0 07 FF E0 03 FF C0 00 05
CD70: FF 00 00 00 00 00 00 00 70
CD78: 00 00 00 00 00 FF 00 03 7B
CD80: EA C0 0F BA A0 3E EA B0 70
CD88: 3E AA A8 3F EA EC 2F EB 4C
CD90: EC 2B BF EC 2A AE BC 2B 16
CD98: EA FC 2A AF BC 3A EE EC 2D
CDA0: 3A BA A8 3E BB A8 0F FA EA
CDA8: B0 0F AE A0 03 AA C0 00 26
CDB0: FF 00 00 00 00 00 00 00 B0
CDB8: 00 00 40 00 00 01 04 11 0F
CDC0: 20 00 00 08 11 00 80 80 FA
CDC8: 04 22 00 42 0C 84 00 C3 85
CDD0: 00 12 0C 80 00 C3 21 08 5C
CDD8: 30 80 42 CF 00 00 30 84 50
CDE0: 04 8C 00 02 32 01 10 00 B6
CDE8: 10 01 21 00 40 00 01 04 60
CDF0: 10 40 00 00 00 00 41 00 82
CDF8: 00 00 00 00 00 00 00 00 F8
CE00: 00 00 00 00 00 00 00 00 00
CE08: 00 00 00 00 00 00 00 00 08
CE10: 00 00 08 00 00 08 00 00 20
CE18: 08 00 00 08 00 00 00 00 28
CE20: 00 00 00 00 00 00 00 00 20
CE28: 00 00 00 00 00 00 00 00 28
CE30: 00 00 00 00 00 00 00 00 30
CE38: FF 00 00 00 00 00 00 00 38
CE40: 00 00 00 00 00 00 00 00 40
CE48: 00 00 00 01 00 80 02 00 CB
CE50: 40 04 00 20 0F 3C F0 1F 10
CE58: FF F8 3F FF FC 7F FF FE 0C
CE60: FF FF FF FF FF FF FF FF 60
CE68: FF FF FF FF 07 FF E0 07 57
CE70: FF E0 00 00 00 00 00 00 51
CE78: 00 00 00 00 00 00 00 00 78
CE80: 00 00 00 00 00 00 00 00 80
CE88: 00 00 00 00 00 00 00 00 88
CE90: 00 00 00 00 00 00 00 00 90
CE98: 00 00 00 00 00 00 00 00 98
CEA0: 00 00 00 00 00 00 00 00 A0
CEA8: 00 00 00 00 00 00 00 00 A8
CEB0: 00 00 07 FF C0 00 7C 00 F4
CEB8: 00 00 00 00 00 00 00 00 B8
CEC0: 00 00 00 00 00 00 00 00 C0
CEC8: 00 00 00 00 00 00 00 00 C8
CED0: 00 00 00 00 00 00 00 00 D0
CED8: 00 00 00 00 00 00 00 00 D8
CEE0: 00 00 00 00 00 00 00 00 E0
CEE8: 00 00 00 00 3F FF FC FF 25
CEF0: FF FF 3F FF FC 00 FF 00 2D
CEF8: 00 00 18 00 00 FF 00 03 14
CF00: 00 C0 06 00 60 08 00 10 3F
CF08: 10 81 08 10 00 08 20 24 FD
CF10: 04 20 18 04 E2 BD 47 E0 19
CF18: 18 07 20 24 04 20 00 04 A3
CF20: 10 81 08 10 00 08 0A 00 DB
```

```
CF28: 50 04 00 20 03 00 C0 00 60
CF30: FF 00 00 18 00 00 18 00 60
CF38: 00 FF FF FF FF FF FF FF 38
CF40: FF FF FF FF FF FF FF FF 40
CF48: FF FF FF FF FF FF FF FF 48
CF50: FF 00 00 00 00 00 00 00 50
CF58: 00 00 00 00 00 00 00 00 58
CF60: 00 00 00 00 00 00 00 00 60
CF68: 00 00 00 00 00 00 00 00 68
CF70: 00 00 00 00 00 00 00 00 70
CF78: 00 00 00 00 00 00 00 00 78
CF80: 00 00 00 00 00 00 00 00 80
CF88: 00 00 00 00 00 00 00 10 98
CF90: 00 00 64 00 01 A9 00 00 9F
CF98: 64 00 00 10 00 00 00 00 0D
CFA0: 00 00 00 00 00 00 00 00 A0
CFA8: 00 00 00 00 00 00 00 00 A8
CFB0: 00 00 00 00 00 00 00 00 B0
CFB8: FF 23 18 40 16 00 B2 00 FC
CFC0: 4C 01 25 3C 42 81 91 91 56
CFC8: 81 42 3C 2A 38 38 7C EE CE
CFD0: EE EE FE C6 18 FF 00 FF 8C
CFD8: 00 FF 00 FF 00 2E 00 00 07
CFE0: 00 08 00 00 00 00 3C 01 26
CFE8: 02 06 0B 18 26 69 9A 3E 7C
CFF0: 80 40 60 D0 18 64 96 59 4F
CFF8: 00 00 00 F8
```

DELUXE LIST
FROM PAGE 36

DELUXE LIST 49152

```
·10 FOR ADD=49152TO49342:READN:CK=CK+N:PO
 KEADD,N:NEXT                                HP
·20 IF CK<>19399 THEN PRINT"ERROR IN DATA
  STATEMENTS[3"."]":STOP                      MJ
·30 PRINT"'SYS49152' TO TOGGLE DELUXE LIS
 T"                                          OG
·40 SYS49152                                 KF
·50 END                                      IC
·60 DATA173,189,192,73,255,141,189,192,20
 8,18                                        JN
·70 DATA169,26,141,6,3,169,167,141,7,3       DF
·80 DATA169,145,160,192,32,30,171,96,169,
 51                                          FF
·90 DATA141,6,3,169,192,141,7,3,169,102      DE
·100 DATA160,192,32,30,171,169,0,141,190,
 192                                         PI
·110 DATA96,141,188,192,201,34,208,8,173,
 190                                         IL
·120 DATA192,73,255,141,190,192,173,188,1
 92,201                                      EB
·130 DATA58,208,18,173,190,192,208,13,169
 ,13                                         NH
·140 DATA32,210,255,169,32,32,210,255,32,
 210                                         PD
·150 DATA255,173,141,2,208,251,173,188,19
 2,76                                        EF
·160 DATA26,167,68,69,76,85,88,69,32,76      NK
·170 DATA73,83,84,32,18,65,67,84,73,86       BK
·180 DATA65,84,69,68,146,45,68,79,32,78      OG
·190 DATA79,84,32,69,68,73,84,32,76,73       KD
·200 DATA78,69,83,13,0,68,69,76,85,88        IN
·210 DATA69,32,76,73,83,84,32,18,68,73       JJ
·220 DATA83,65,66,76,69,68,146,45,89,79      PD
·230 DATA85,32,77,65,89,32,69,68,73,84       DP
·240 DATA32,76,73,78,69,83,13,0,0,0          AD
·250 DATA0                                   LH
```

DELUXE LIST 828

```
·10 FOR ADD=828TO1018:READN:CK=CK+N:POKEA
 DD,N:NEXT                                   DD
·20 IF CK<>17851 THEN PRINT"ERROR IN DATA
  STATEMENTS[3"."]":STOP                      MA
·30 PRINT"'SYS828' TO TOGGLE DELUXE LIST"    OK
·40 SYS828                                   EF
·50 END                                      IC
·60 DATA173,249,3,73,255,141,249,3,208,18    NL
·70 DATA169,26,141,6,3,169,167,141,7,3       DF
·80 DATA169,205,160,3,32,30,171,96,169,11
 1                                           FK
·90 DATA141,6,3,169,3,141,7,3,169,162        GO
·100 DATA160,3,32,30,171,169,0,141,250,3     JN
·110 DATA96,141,248,3,201,34,208,8,173,25
 0                                           BD
·120 DATA3,73,255,141,250,3,173,248,3,201    HB
·130 DATA58,208,18,173,250,3,208,13,169,1
 3                                           IK
·140 DATA32,210,255,169,32,32,210,255,32,
 210                                         PD
·150 DATA255,173,141,2,208,251,173,248,3,
 76                                          JK
·160 DATA26,167,68,69,76,85,88,69,32,76      NK
·170 DATA73,83,84,32,18,65,67,84,73,86       BK
·180 DATA65,84,69,68,146,45,68,79,32,78      OG
·190 DATA79,84,32,69,68,73,84,32,76,73       KD
·200 DATA78,69,83,13,0,68,69,76,85,88        IN
·210 DATA69,32,76,73,83,84,32,18,68,73       JJ
·220 DATA83,65,66,76,69,68,146,45,89,79      PD
·230 DATA85,32,77,65,89,32,69,68,73,84       DP
·240 DATA32,76,73,78,69,83,13,0,0,0          AD
·250 DATA0                                   LH
```

AHOY! BBS GOES 1200 BAUD!

Effective immediately, the 24 hour a day *Ahoy!* Bulletin Board System can be accessed at 300 or 1200 baud, in 40 or 80 columns.

Set your modem for full duplex, no parity, 1 stop bit, 8-bit word length, and dial

718-383-8909

DETONATION
FROM PAGE 56

Beginning address in hex: C000
Ending address in hex: CB5F
SYS to start: 49152
***Flankspeed* required for entry! See page 121.**

```
C000: 20 C3 C2 4C CB C5 A9 00 2E
C008: 8D B6 03 AD B7 03 8D FD 43
C010: 07 8D FE 07 8D FF 07 EE 2E
C018: B7 03 AD B7 03 C9 C8 D0 9E
C020: 05 A9 C4 8D B7 03 EA AD 74
C028: B9 03 D0 1B EE B8 03 AD 29
C030: B8 03 C9 AE D0 04 EE B9 E1
C038: 03 60 AD B8 03 8D 0B D0 6E
C040: CE 0D D0 EE 0E D0 60 CE E9
C048: B8 03 AD B8 03 C9 6A D0 72
C050: 04 CE B9 03 60 AD B8 03 A9
C058: 8D 0B D0 EE 0D D0 CE 0E 6B
C060: D0 60 AD E7 03 C9 06 B0 AA
C068: 03 4C 81 C0 A9 00 8D E7 19
C070: 03 AD F8 07 C9 C9 F0 06 AB
C078: EE F8 07 4C 81 C0 CE F8 BD
C080: 07 AD 00 DC 29 08 D0 2A 3E
C088: EE E7 03 AD 10 D0 29 01 1B
C090: D0 16 E6 FB A5 FB C9 FF C5
C098: D0 18 E6 FB 18 AD 10 D0 0B
C0A0: 69 01 8D 10 D0 4C B2 C0 39
C0A8: E6 FB A5 FB C9 39 D0 02 03
C0B0: C6 FB AD 00 DC 29 04 D0 FB
C0B8: 2C EE E7 03 AD 10 D0 29 76
C0C0: 01 D0 0D C6 FB A5 FB C9 CD
C0C8: 1D D0 1A E6 FB 4C E5 C0 A6
C0D0: C6 FB A5 FB C9 00 D0 0D DC
C0D8: 38 AD 10 D0 E9 01 8D 10 28
C0E0: D0 A9 FF 85 FB AD 00 DC 67
C0E8: 29 02 D0 0D EE E7 03 E6 B2
C0F0: FC A5 FC C9 DD D0 02 C6 D1
C0F8: FC AD 00 DC 29 01 D0 0D 88
C100: EE E7 03 C6 FC A5 FC C9 0A
C108: 33 D0 02 E6 FC A5 FB 8D 21
C110: 00 D0 A5 FC 8D 01 D0 20 03
C118: 8E C6 EA CE BC 02 AD BC 50
C120: 02 D0 26 A9 20 8D 04 D4 49
C128: A9 01 8D BC 02 CE BE 02 AE
C130: AD BE 02 D0 14 EE BD 02 32
C138: AE BD 02 E0 1F D0 1A A2 34
C140: FF 8E BD 02 A9 01 8D BE 85
C148: 02 A9 00 8D C5 02 EE C5 FD
C150: 02 AD C5 02 C9 05 D0 F6 5E
C158: 60 A9 21 8D 04 D4 BD DD 85
C160: C9 8D 00 D4 BD FD C9 8D 9F
C168: 01 D4 BD 1D CA 8D BC 02 30
C170: 18 6D BC 02 8D BE 02 4C 4F
C178: 49 C1 E6 FD A5 FD C9 0B E0
C180: D0 07 20 06 C0 A9 00 85 6E
C188: FD 20 62 C0 EA EA AD CA 18
C190: 03 20 B8 C1 A9 80 8D 12 F7
C198: D4 A2 00 E8 E0 00 D0 FB A6
C1A0: AD CB 03 20 B8 C1 A9 81 E2
C1A8: 8D 12 D4 20 DE FF 8E CF 7A
C1B0: 03 E0 01 B0 0A 4C 3D C2 9C
C1B8: 8D E7 07 60 EA EA EA AD 04
C1C0: B9 C1 8D CE C1 AD BA C1 84
C1C8: 8D CF C1 A9 20 8D 06 04 49
C1D0: EA EA EA AD C6 03 C9 6B 3E
C1D8: D0 03 4C C2 C4 AD C6 03 F7
C1E0: AA BD 3E CA 8D B9 C1 BD 19
C1E8: AA CA 8D BA C1 EE C6 03 21
C1F0: AD B9 C1 C9 27 D0 0A A9 8F
C1F8: 25 8D CA 03 A9 26 8D CB A2
C200: 03 AD B9 C1 C9 00 D0 0A D0
C208: A9 27 8D CA 03 A9 28 8D 93
C210: CB 03 AD B9 C1 C9 C0 D0 63
C218: 0A A9 29 8D CA 03 A9 2A 24
C220: 8D CB 03 AD B9 C1 C9 D3 43
C228: D0 0A A9 23 8D CA 03 A9 D4
C230: 24 8D CB 03 A9 00 A2 00 FC
C238: A0 00 20 DB FF AD 1E D0 71
C240: C9 00 F0 08 A9 00 8D 1E 58
C248: D0 4C BF C1 AD 1F D0 C9 4E
C250: 00 F0 03 20 63 C2 AD C0 F8
C258: 03 C9 03 D0 03 20 60 C4 41
C260: 4C 7A C1 AD 01 D0 C9 64 96
C268: B0 13 AD A7 02 D0 28 A9 26
C270: 20 8D 63 04 EE A7 02 EE 0D
C278: C0 03 4C A8 C2 AD 10 D0 82
C280: C9 45 D0 14 AD A8 02 D0 9D
C288: 0E A9 20 8D 04 06 EE A8 8F
C290: 02 EE C0 03 4C A8 C2 60 5D
C298: AD A9 02 D0 FA A9 20 8D 15
C2A0: E3 05 EE A9 02 EE C0 03 D6
C2A8: A9 41 8D 04 D4 8D 00 D4 5C
C2B0: A0 14 20 8E C6 8C 01 D4 3D
C2B8: 88 C0 00 D0 F5 A9 00 8D FF
C2C0: 1F D0 60 AD 0E DC 29 FE D1
C2C8: 8D 0E DC A5 01 29 FB 85 92
C2D0: 01 A2 00 BD 00 D0 9D 00 A0
C2D8: 38 E8 E0 00 D0 F5 A2 00 44
C2E0: BD 00 D1 9D 00 39 E8 E0 11
C2E8: 00 D0 F5 A2 00 BD 65 C9 3F
C2F0: 9D 18 39 E8 E0 50 D0 F5 C0
C2F8: A2 00 BD B5 C9 9D D8 38 87
C300: E8 E0 28 D0 F5 A5 01 09 68
C308: 04 85 01 AD 0E DC 09 01 35
C310: 8D 0E DC 18 AD 18 D0 29 60
C318: F0 69 0E 8D 18 D0 A2 00 99
C320: BD AE C6 9D 00 D0 E8 E0 8B
C328: 2F D0 F5 A2 00 BD DD C6 23
C330: 9D F8 07 E8 E0 08 D0 F5 66
C338: A2 00 BD E5 C6 9D 00 30 13
C340: E8 E0 00 D0 F5 A2 00 BD 31
C348: E5 C7 9D 00 31 E8 E0 00 8E
C350: D0 F5 A2 00 BD E5 C8 9D C3
C358: 00 32 E8 E0 80 D0 F5 A2 3E
```

```
C360: 00 BD 15 CB 9D 00 D4 E8 5A
C368: E0 19 D0 F5 A9 00 8D B9 1A
C370: 03 8D B6 03 8D E7 03 8D C0
C378: C0 03 8D C6 03 8D CF 03 F3
C380: 8D BC 02 8D BD 02 8D BE 66
C388: 02 8D C5 02 AD 00 D0 85 E3
C390: FB AD 01 D0 85 FC A9 6A A2
C398: 8D B8 03 A9 C4 8D B7 03 98
C3A0: A9 E7 8D B9 C1 A9 07 8D 79
C3A8: BA C1 A9 1C 8D FE 02 20 99
C3B0: D2 FF A9 93 20 D2 FF A9 5D
C3B8: 00 8D FF 02 AD FF 02 AA A2
C3C0: BD 3E CA 8D D0 C3 BD AA 12
C3C8: CA 8D D1 C3 AD FE 02 8D F2
C3D0: D3 07 EE FF 02 AD D0 C3 DE
C3D8: C9 4F D0 03 EE FE 02 AD 63
C3E0: D0 C3 C9 27 D0 05 A9 1B 01
C3E8: 8D FE 02 AD D0 C3 C9 01 84
C3F0: D0 05 A9 1E 8D FE 02 AD CA
C3F8: D0 C3 C9 00 D0 05 A9 1C F2
C400: 8D FE 02 AD D0 C3 C9 98 33
C408: D0 05 A9 1F 8D FE 02 AD E2
C410: D0 C3 C9 C0 D0 05 A9 1B C9
C418: 8D FE 02 AD D0 C3 C9 D2 85
C420: D0 05 A9 2C 8D FE 02 AD 08
C428: D0 C3 C9 D3 D0 03 4C 34 AE
C430: C4 4C BC C3 A9 23 8D CA E6
C438: 03 A9 24 8D CB 03 A9 03 12
C440: 20 D2 FF A9 2B 8D 63 04 FC
C448: 8D E3 05 8D 04 06 A9 00 FF
C450: 8D C1 03 8D 1F D0 A9 DC A6
C458: 8D 93 C4 8D 98 C4 60 EA 74
C460: A5 FB C9 A0 B0 01 60 A5 24
C468: FB C9 AF 90 01 60 A5 FC 72
C470: C9 CF B0 01 60 A5 FC C9 88
C478: D7 90 01 60 A9 00 8D A7 21
C480: 02 8D A8 02 8D A9 02 8D 81
C488: C0 03 EE 93 C4 EE 98 C4 DF
C490: A9 2B 8D DC 07 A9 08 8D 16
C498: DC DB EE C1 03 AD C1 03 77
C4A0: C9 0B D0 03 4C 43 C6 CE 6E
C4A8: 7F C1 A2 1F DE 1D CA CA 3D
C4B0: E0 FF D0 F8 A9 2B 8D 63 21
C4B8: 04 8D E3 05 8D 04 06 4C 17
C4C0: 7A C1 A9 00 8D C9 03 A9 AA
C4C8: C0 8D C2 03 A9 81 8D 12 A7
C4D0: D4 A9 93 20 D2 FF 20 8E 84
C4D8: C6 A2 00 DE 01 D0 E8 E8 C4
C4E0: E0 10 D0 F7 CE 02 D0 CE 0B
C4E8: 0A D0 CE 04 D0 EE 0C D0 33
C4F0: AD 09 D0 8D 21 D0 8D 0F 94
C4F8: D4 A2 00 AD C2 03 9D F9 7B
C500: 07 E8 E0 04 D0 F8 EE C2 50
C508: 03 AD C2 03 C9 C4 D0 05 E2
C510: A9 C0 8D C2 03 EE C9 03 89
C518: AD C9 03 C9 DC D0 03 4C 59
C520: 25 C5 4C D6 C4 A9 00 8D 2A
C528: 15 D0 AD C9 03 8D 21 D0 08
C530: 8D 20 D0 8D 0F D4 20 8E CE
C538: C6 CE C9 03 AD C9 03 C9 DE
C540: 00 D0 E7 20 8E C6 8D 18 14
C548: D4 A2 00 BD 2E CB 9D C7 DC
C550: 05 A9 06 9D C7 D9 E8 E0 0E
C558: 0A D0 F0 A2 00 BD 38 CB 88
C560: 9D 17 06 A9 02 9D 17 DA 56
C568: E8 E0 0A D0 F0 AD 00 DC 88
C570: 29 10 D0 F9 A9 00 8D A7 53
C578: 02 8D A8 02 8D A9 02 A2 8E
C580: 00 BD 5A CB 9D C7 05 9D 6C
C588: 17 06 E8 E0 0A D0 F2 A2 DF
C590: 00 BD A7 C5 9D 1D CA E8 2A
C598: E0 20 D0 F5 A9 0B 8D 7F 22
C5A0: C1 20 C3 C2 4C 7A C1 19 AA
C5A8: 19 12 0E 0E 19 12 12 12 3F
C5B0: 12 0E 0E 0E 0E 19 15 0E 37
C5B8: 15 0E 15 0E 0E 0E 0E 0E 37
C5C0: 19 19 12 0E 0E 19 19 EA 3E
C5C8: EA EA EA A2 00 BD 4E CB 04
C5D0: 9D C7 05 A9 0D 9D C7 D9 31
C5D8: E8 E0 0A D0 F0 AD 58 CB 40
C5E0: 8D F3 05 AD 59 CB 8D F4 BC
C5E8: 05 A2 00 BD 42 CB 9D 16 10
C5F0: 06 A9 05 9D 16 DA E8 E0 FD
C5F8: 0C D0 F0 A2 00 BD 38 CB 2B
C600: 9D 67 06 A9 01 9D 67 DA 95
C608: E8 E0 0A D0 F0 EA AD 00 36
C610: DC 29 10 F0 09 20 1B C1 1D
C618: 20 8E C6 4C 0E C6 A2 00 51
C620: AD 5A CB 9D C6 05 9D EE E9
C628: 05 9D 16 06 9D 66 06 E8 D9
C630: E0 0C D0 EC A9 00 8D A7 B9
C638: 02 8D A8 02 8D A9 02 4C F7
C640: 7A C1 EA A2 00 BD A2 C6 31
C648: 9D 9E 05 A9 04 9D 9E D9 4D
C650: E8 E0 0C D0 F0 EE C6 03 A0
C658: AD C6 03 C9 6D D0 03 4C 27
C660: 81 C6 AD A6 05 C9 39 F0 F5
C668: 06 EE A6 05 4C 55 C6 A9 1B
C670: 30 8D A6 05 AD A5 05 C9 FB
C678: 39 F0 06 EE A5 05 4C 55 E3
C680: C6 A9 DC 8D 93 C4 8D 98 D9
C688: C4 A9 00 4C 46 C5 A9 00 F8
C690: 8D F2 03 EE F2 03 AD F2 99
C698: 03 C9 00 D0 F6 60 EA EA 63
C6A0: EA EA 13 03 0F 12 05 20 D2
C6A8: 20 30 30 30 30 30 A6 D2 33
C6B0: 21 85 21 85 9B 3B 9B D3 44
C6B8: 50 6A 06 AE 85 5A 44 1B 67
C6C0: 00 00 00 FF C8 1E 1F 00 C6
C6C8: 00 00 00 1E 00 00 00 00 E6
C6D0: 00 00 00 00 00 0D 06 06 E9
C6D8: 06 01 07 07 07 C8 C0 C1 40
C6E0: C2 C3 C4 C4 C4 FF FF FC B2
C6E8: C0 00 0C C0 00 00 C0 00 37
C6F0: 00 C0 00 00 C0 00 00 C0 33
C6F8: 00 00 C0 00 00 C0 00 00 7A
```

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C700: C0 00 00 C0 00 00 C0 00 42
C708: 00 C0 00 00 C0 00 00 C0 4A
C710: 00 00 C0 00 0C FF FF FC D9
C718: 00 00 00 00 00 00 00 00 18
C720: 00 00 00 00 00 FF FF FC 1D
C728: C0 00 0C 00 00 0C 00 00 01
C730: 0C 00 00 0C 00 00 0C 00 54
C738: 00 0C 00 00 0C 00 00 0C 5C
C740: 00 00 0C 00 00 0C 00 00 58
C748: 0C 00 00 0C 00 00 0C 00 6C
C750: 00 0C C0 00 0C FF FF FC 26
C758: 00 00 00 00 00 00 00 00 58
C760: 00 00 00 00 00 FF FF FF 60
C768: C0 00 03 C0 00 03 C0 00 B0
C770: 03 C0 00 03 C0 00 03 C0 BB
C778: 00 03 C0 00 03 C0 00 03 03
C780: C0 00 03 C0 00 03 C0 00 C8
C788: 03 C0 00 03 C0 00 03 F0 04
C790: 00 0F 00 00 00 00 00 00 9F
C798: 00 00 00 00 00 00 00 00 98
C7A0: 00 00 00 00 00 F0 00 0F A0
C7A8: C0 00 03 C0 00 03 C0 00 F0
C7B0: 03 C0 00 03 C0 00 03 C0 FB
C7B8: 00 03 C0 00 03 C0 00 03 43
C7C0: C0 00 03 C0 00 03 C0 00 09
C7C8: 03 C0 00 03 C0 00 03 FF 53
C7D0: FF FF 00 00 00 00 00 00 D0
C7D8: 00 00 00 00 00 00 00 00 D8
C7E0: 00 00 00 00 00 00 00 00 E0
C7E8: 00 00 00 01 FF 00 03 01 ED
C7F0: 80 06 00 C0 0C 00 60 18 BC
C7F8: 00 30 00 7C 30 00 C6 30 CC
C800: 01 86 30 01 8C 30 01 80 F6
C808: 60 00 C0 C0 00 7F 80 00 E9
C810: 00 00 00 00 00 00 00 00 10
C818: 00 00 00 00 00 00 00 00 18
C820: 00 00 00 00 00 00 00 00 20
C828: 00 00 00 00 00 40 00 00 68
C830: 60 00 00 30 00 00 18 00 D8
C838: 7C 0C 00 C6 0C 01 83 0C 24
C840: 03 01 0C 03 1B 0C 03 0E 8B
C848: 0C 03 00 18 01 80 30 00 21
C850: C0 60 00 3F C0 00 00 00 71
C858: 00 00 00 00 00 00 00 00 58
C860: 00 00 00 00 00 00 00 00 60
C868: 00 00 00 00 00 00 00 00 68
C870: 00 00 00 00 00 00 00 00 70
C878: 00 00 00 FF 00 01 81 80 7B
C880: 03 00 C0 06 18 C0 06 30 59
C888: C0 06 31 80 06 1F 00 06 2C
C890: 00 0C 03 00 18 01 80 30 69
C898: 00 C0 60 00 7F C0 00 00 F9
C8A0: 00 00 00 00 00 00 00 00 A0
C8A8: 00 00 00 00 00 00 00 00 A8
C8B0: 00 00 00 00 03 FC 00 06 B6
C8B8: 03 00 0C 01 80 18 00 C0 22
C8C0: 30 70 C0 30 D8 C0 30 80 9C
C8C8: C0 30 C1 80 30 63 00 30 BF
C8D0: 3E 00 18 00 00 0C 00 00 33
C8D8: 06 00 00 02 00 00 00 00 E0
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C8F8: 00 00 00 00 00 00 10 00 09
C900: 00 54 00 00 54 00 00 10 B8
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C910: 7D 00 06 7D 80 00 7C 00 0E
C918: 00 7C 00 00 44 00 00 24 FC
C920: 00 00 36 00 00 00 00 00 56
C928: 00 00 00 00 00 00 00 00 28
C930: 00 00 00 00 00 00 00 00 30
C938: 00 00 00 00 00 00 10 00 48
C940: 00 54 00 00 54 00 00 10 F8
C948: 00 00 38 00 00 FE 00 01 80
C950: 7D 00 03 7C C0 00 7C 00 8A
C958: 00 7C 00 00 44 00 00 44 5D
C960: 00 00 C6 00 00 18 18 18 6F
C968: 18 18 24 4A 91 18 18 18 E0
C970: 18 3C 5A A5 00 00 07 08 D3
C978: F5 F2 08 07 00 00 0C 10 8C
C980: E4 E8 10 0C 00 89 52 24 6A
C988: 18 18 18 18 18 18 00 A5 5A 01
C990: 3C 18 18 18 18 18 00 E0 10 1E
C998: BF 5F 10 E0 00 00 30 08 E0
C9A0: 27 17 08 30 00 18 18 7E C5
C9A8: FF FF FF FF 7E 18 18 18 6F
C9B0: F8 F8 00 00 00 00 00 00 A2
C9B8: FF FF 00 00 00 18 18 18 01
C9C0: 18 18 18 18 18 18 00 00 00 39
C9C8: F8 F8 18 18 18 18 00 00 00 03
C9D0: 1F 1F 18 18 18 18 18 18 9F
C9D8: 1F 1F 00 00 00 47 B4 47 5A
C9E0: 47 47 F4 47 47 ED ED 47 16
C9E8: 47 47 47 ED E9 0C E9 0C 98
C9F0: E9 0C E9 0C 47 ED 47 B4 0E
C9F8: 47 47 47 F4 F4 05 04 05 C6
CA00: 05 05 03 05 05 05 05 06 27
CA08: 06 06 06 05 07 07 07 07 3B
CA10: 07 07 07 07 06 05 05 04 40
CA18: 05 05 05 03 03 19 19 12 71
CA20: 0E 0E 19 12 12 12 12 0E AB
CA28: 0E 0E 0E 19 15 0E 15 0E B1
CA30: 15 0E 0E 0E 0E 0E 19 19 BD
CA38: 12 0E 0E 19 19 5A E7 BF 9A
CA40: 97 6F 47 1F F7 CF A7 7F 9C
CA48: 57 2F 07 DF B7 8F 67 3F A3
CA50: 17 EF C7 9F 77 4F 27 26 D2
CA58: 25 24 23 22 21 20 1F 1E 65
CA60: 1D 1C 1B 1A 19 18 17 16 2D
CA68: 15 14 13 12 11 10 0F 0E F4
CA70: 0D 0C 0B 0A 09 08 07 06 BC
CA78: 05 04 03 02 01 00 28 50 FF
CA80: 78 A0 C8 F0 18 40 68 90 A4
CA88: B8 E0 08 30 58 80 A8 D0 AC
CA90: F8 20 48 70 98 C0 C1 C2 40
CA98: C3 C4 C5 C6 C7 C8 C9 CA D2
```

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CAA0: CB CC CD CE CF D0 D1 D2 1B
CAA8: D3 00 07 07 07 07 07 07 A6
CAB0: 06 06 06 06 06 06 06 05 DF
CAB8: 05 05 05 05 05 04 04 04 DD
CAC0: 04 04 04 04 04 04 04 04 E0
CAC8: 04 04 04 04 04 04 04 04 E8
CAD0: 04 04 04 04 04 04 04 04 F0
CAD8: 04 04 04 04 04 04 04 04 F8
CAE0: 04 04 04 04 04 04 04 04 01
CAE8: 04 04 04 04 04 04 04 04 09
CAF0: 05 05 05 05 05 05 06 06 1B
CAF8: 06 06 06 06 06 07 07 07 2C
```

```
CB00: 07 07 07 07 07 07 07 07 38
CB08: 07 07 07 07 07 07 07 07 40
CB10: 07 07 07 07 07 00 00 00 33
CB18: 14 20 0A 0A 00 00 00 00 60
CB20: 00 00 00 0A 01 00 00 80 AB
CB28: 01 FA 00 00 00 0F 07 01 3B
CB30: 0D 05 20 20 0F 16 05 12 BE
CB38: 10 12 05 13 13 20 06 09 B4
CB40: 12 05 02 0F 02 20 02 0C 98
CB48: 01 03 0B 0D 05 12 04 05 84
CB50: 14 0F 0E 01 14 09 0F 0E BC
CB58: 02 19 20 00 FF 00 FF 00 93
```

SCUTTLEBUTT

Continued from page 14

will be made available for popular sampling units at a later date.)

MIDImouse Music, 503-622-5451 (see address list, page 14).

DELUXEPAINT ADD-ONS

Two new EA programs for use with *DeluxePaint,* each $99.95:

The *DeluxePaint* color printing program has 15 formats for creating a variety of greeting cards, banners, and the like. An unlimited number of images can be placed on the page, edited, flipped, shrunk or expanded, and changed in color. All 11 Amiga fonts plus 3 sizes and 3 styles are supported, for a total of 99 text types. Two sets of large character are useful for banners and posters.

DeluxeVideo allows owners of a 512K Amiga and a VCR to create video presentations for business, education, or entertainment use. The video editor includes 27 special effects like wipes, fades, and dissolves, 3-D axis rotation for titles, strobes, and multiframe animation, plus zoom, shrink, disappear, move, and color cycle. An onscreen remote controller provides 12 commands including fast forward/reverse, single step, and cycle repeat.

A library of images is included; or, drawings from *DeluxePaint* or other IFF-compatible graphics packages can be animated in any sequence or speed. Music scores and digitized sound effects like crashes, booms, and screeches are provided.

Electronic Arts, 415-571-7171 (see address list, page 14).

HANDWRITING ANALYZER

Handwriting Analyzer ($19.95) utilizes various well-known theories to generate a page-long analysis of a writer, based on the C-64 user's answers to 20 questions concerning a writing sample of 300 words or more. Available on disk or tape.

CTL Software, 408-263-1623 (see address list, page 14).

QUANTUMLINK ADDITIONS

The latest new services on QuantumLink include a GEOS forum (Q & A sessions with the program's developers, conferences on applications, news on latest developments and software), a Photo Gallery (converts subscriber photographs into computer programs for downloading), and RockLink (news on top stars, music review board, rock library, and monthly guests). Additionally, the Mall has been expanded to include a live auction.

QuantumLink, 800-392-8200 or 703-448-8700 (see address list, page 14).

FOUR MORE

Four More for the 64 ($9.95), a second disk of programs from AC3L Software, includes *TV Align* (checks colors, sound, etc.), *Treasure Map* (treasure searching game), *Find It* (locates words in hidden word puzzles), and *Trivia* (500 questions for 1-6 players or teams). PA residents must add 6% sales tax.

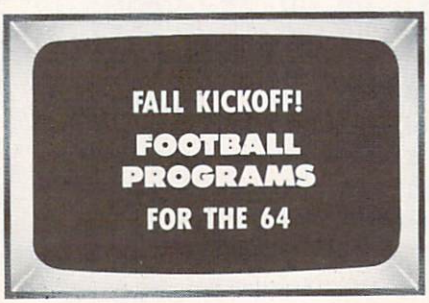
AC3L Software (see address list, page 14).

BBS SYSTEM

The *Syntech BBS Construction Set* ($49.95), a C-64 bulletin board system, includes an editor with onscreen formatting and wordwrap, 12-hour clock and day of the week calendar, printer dump option, up to 25 subboards with rotating, self-maintaining message base, 11 customizable status levels, remote operation, and other features.

KIRA Corporation, 215-683-5699 (see address list, page 14).

...COMING IN THE DECEMBER ISSUE OF *AHOY!* (ON SALE NOVEMBER 4)...



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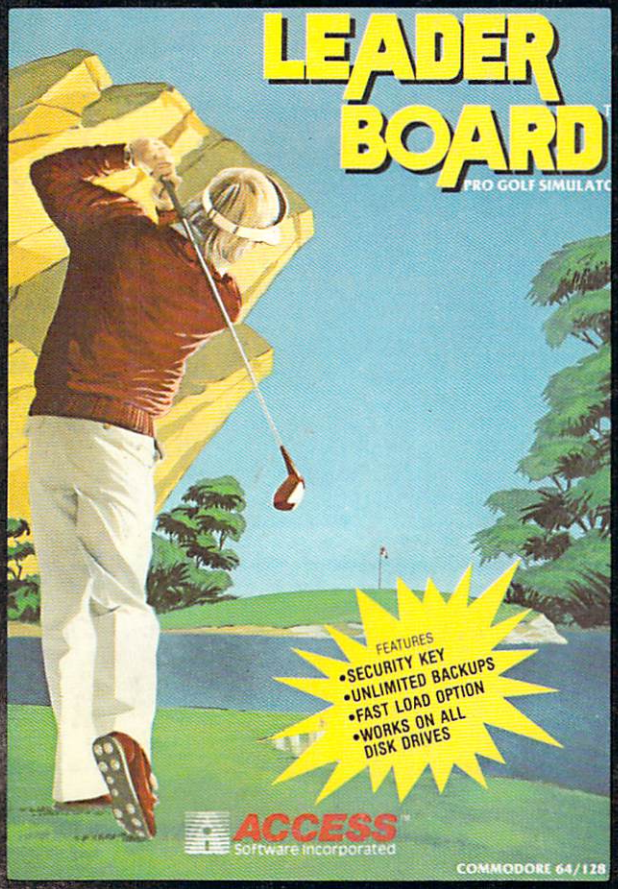

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- **Practice Driving Range**
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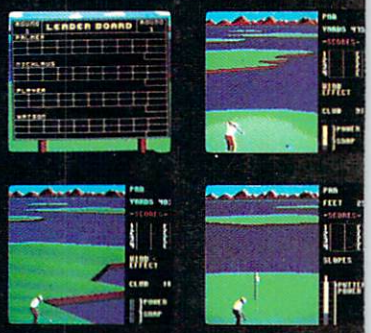

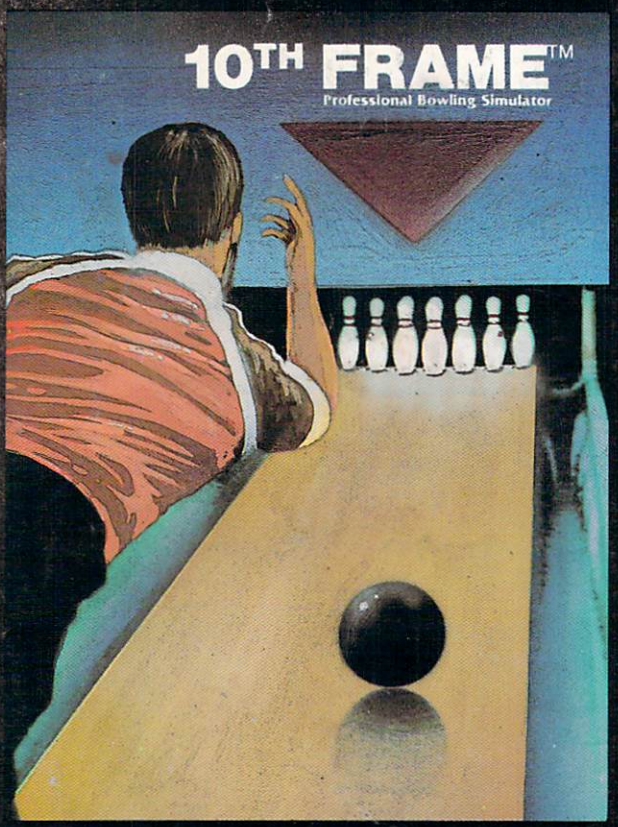

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